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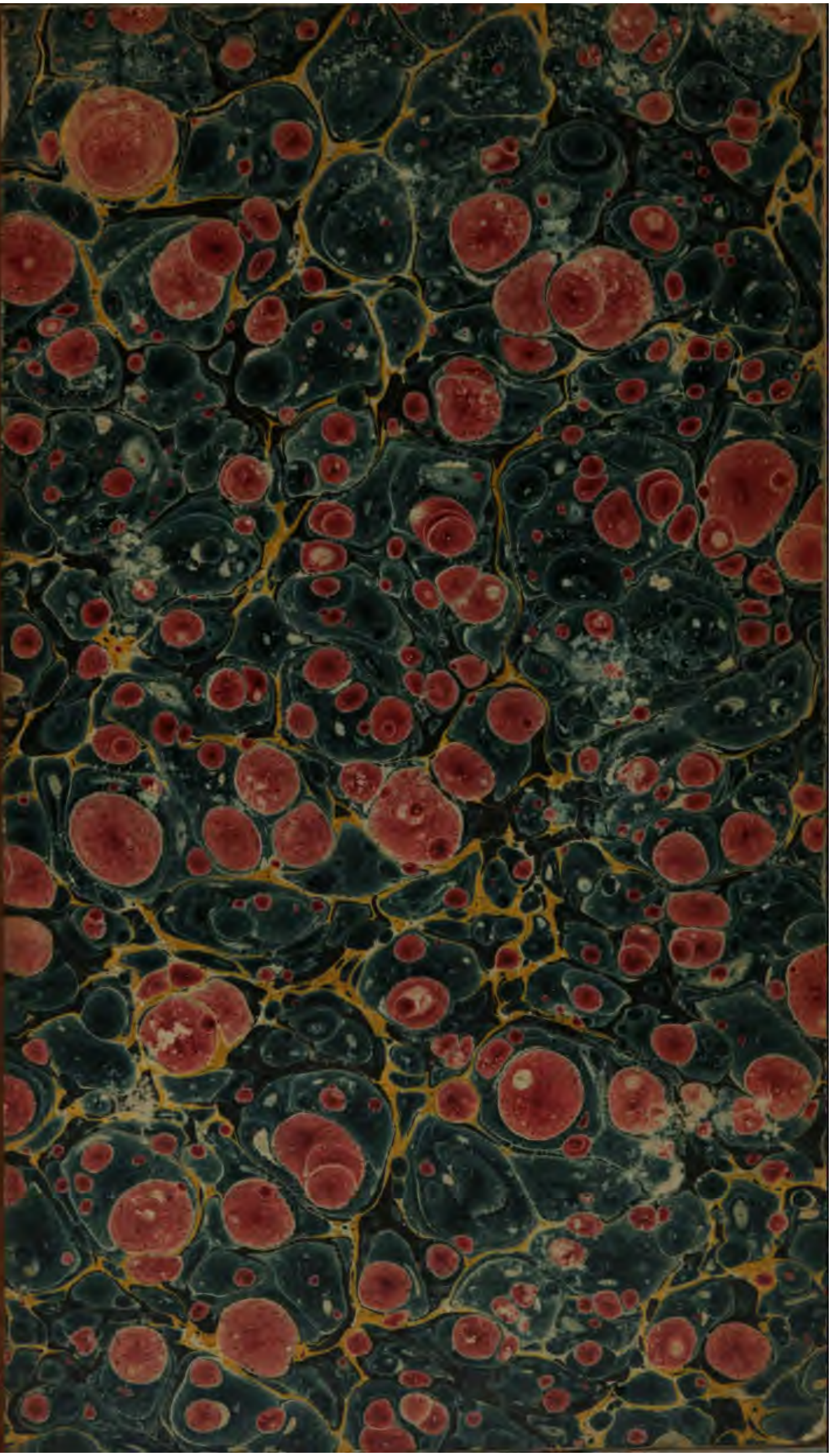

G. A. Lancs.
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Lancashire.
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A REPORT

OF THE

SANATORY CONDITION

OF THE

BOROUGH OF BOLTON,

IN

A LETTER

ADDRESSED TO

THOMAS RIDGWAY BRIDSON, ESQ.,

MAYOR.

By John Entwisle.

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PREFACE.

THE following Report was prepared at the request of the MAYOR of the Borough, who felt anxious that something should be done towards improving the health of the town. This request was, however, simply in his private capacity, and did not place the writer under the auspices of the Town Council. The materials were therefore collected by private investigation solely, with such assistance as several gentlemen in official situations were kind enough to afford. Had I not been fortunate in this respect, I should have despaired of obtaining such information as I knew would be absolutely necessary to render a local report of any value whatever. I have great pleasure in expressing my lively sense of the obligations under which their kindness has laid me; particularly to Mr. WOODHOUSE, the Superintendent Registrar, for the readiness with which he facilitated my access to the registries of deaths; and also to his clerk, Mr. SMITH, for his kind assistance in their examination. For the information relative to the mains, altitudes of the reservoirs, &c. of the Water Works, I am indebted to the kindness of Mr. THOMAS GREEN.

I have derived much assistance from the published

Reports of the Health of Towns' Commission, inasmuch as they suggested topics of inquiry and discussion which I might otherwise have overlooked.

I have stated that this inquiry was undertaken at the request of the MAYOR; this shews his Worship's anxiety respecting the subject of the health of towns, but by no means commits him to the statements made in this Report: for the statements of fact, and the opinions expressed, I alone am responsible.

J. E.

BOLTON, JUNE 10TH, 1848.

ERRATA.

Page 11, column "Metropolis," line 3, *for* 8,630 *read* 3,630.
Page 16, line 30. *for* epidemic *read* epidemics.
Page 58, line 9, *for* maters *read* matters.
Page 60, line 4, *for* convey *read* conveys; and *for* graveyards *read* graveyard.
Page 64, line 37, *for* £4,629,979, *read* £1,629,979.
Page 65, line 22. I have committed an error in saying that the value of the loss of life in excess of the loss incurred by the Surrey population is £162,260. The statement is true of the first item, £99,569. The second item, £62,691, is the absolute loss due to the deaths under 15, a portion of which only is in excess of the loss incurred by the Surrey population.
Page 72, line 36, *for* Mr. Anderson *read* Mr. Anderton.

TO

THOMAS RIDGWAY BRIDSON, ESQ.,

MAYOR OF THE

BOROUGH OF BOLTON.

May it Please your Worship,—At your request I have endeavoured to collect the evidence necessary to shew the absolute and relative sanatory condition of the borough, and the causes to which the present high rate of mortality is due; and to offer also some suggestions for their effectual removal. It is not to be expected that, after the laborious investigations which several distinguished advocates of sanatory reform have undertaken, and the results of which have been given to the public in the form of local and general reports of great value, that another local report should do more than add to the already accumulated evidence which incontestably proves that the waste of life now taking place in all our large towns is due to causes that are capable of removal. In examining the health of towns, it is desirable to separate as much as possible those districts which are superior in respect to drainage, cleanliness, width of streets, &c. from those which are close, crowded, dirty, and badly drained; in order that the increased ratio of mortality and sickness, experienced by the inhabitants of a badly constituted district, may be clearly placed in juxta-position with its immediate causes.

There was considerable difficulty, however, in applying this principle to the present investigation, beyond the separation of the Townships of Great and Little Bolton. Every one acquainted with the town will immediately perceive that no district possessing an efficient drainage, and superior in the width of its streets, and the absence of especial nuisances, and at the same time sufficiently large to afford data from which a conclusion could be safely drawn, can be separated from the mass of the town, and made the subject of a special enquiry. The dwellings of the lower and middle classes are more intimately mixed together, and more equally distributed over the entire borough, than seems to have been the case in other towns where local Sanatory Reports have been prepared; while, with respect to the class of independent gentry, they form, perhaps, a smaller proportion to the total population than in any other town of equal importance in the entire kingdom. If a number of streets similar to Silverwell street and Wood street had existed contiguous to each other, and forming a tolerably well defined portion of the town, such a district would, no doubt, have yielded results in striking contrasts with the results obtained from such places as Oliver Lane, Clarke's Entry, Wigan Lane, Gaffer's Ginnel, Taylor Brow, and many other similar places.

As one half of the population of the Bolton Union belongs to the rural districts, the annual mortality exhibited in the Registrar General's Reports is not near so excessive in proportion to the population, as the mortality of the borough alone. The mortality for the entire Union is, upon the average of the four years 1841, 2, 3, 4,—2,7 per cent; which contrasts favourably with Manchester, (3,2 per cent,) and Liverpool, (3,5 per cent.) But if we determine the rate of mortality from the deaths occurring in the borough, compared with the population, we shall obtain very different results. The total number of deaths which occurred in the five years, ending December 1847, were in Great Bolton, 6565—Little Bolton, 2425, and in the Out-Townships, 5,594. The population, as enumerated in 1841, was, for Great Bolton, 33,609—for Little Bolton, 16,144—for the Out-Townships, 47,766. Supposing the population to have increased at the same rate since 1841, as before, the following table will exhibit the probable population in 1845, and the mortality per cent, derived from the average of five years ending 1847:—

TOWNSHIPS.	Population in 1845.	Deaths, per anm.	Mortality, per cent.	Or one in	Excess over 2 per cent.	Total excess for 5 years.
Great Bolton ...	35,914	1313	3,65	27.39	595	2975
Little Bolton ...	17,251	485	2,81	35,58	140	700
Out Townships	51,043	1119	2,19	45,66	86	430

This table shews that the condition of Little Bolton is much superior to that of Great Bolton, which exhibits a rate of mortality higher even than that of Liverpool. The mortality of the rural districts is little more than 2 per cent; and when we consider that in the rural districts immediately surrounding the town, many removeable causes of disease and death exist, and that many of these causes, such as arise from the improper construction of the dwellings of the poor, from their domestic arrangements, habits, and employments, are precisely the same as those operating in the town; and when we also remember that in several large counties the mortality for the entire population, including the inhabitants of the towns, is below two per cent, we shall scarcely be disposed to doubt, that by proper sanatory regulations, the mortality may be reduced in this borough, to at least two per cent. Tried by this standard Great Bolton presents an enormous waste of human life, 595 deaths occurring annually in excess of two per cent.; and in Little Bolton 140: or in other words, the preventible causes of disease, have, in five years, slain 3675 human beings. Who can adequately conceive the vast amount of misery indicated by these figures—the agony of acute or prolonged sickness endured by the sufferers, the anguish of bereavement felt by the survivors, the poverty, destitution, and pauperism not unfrequently resulting from the bereavement—the forlorn wretchedness of unprotected orphanage, or solitary widowhood, and all the other domestic and social evils which result from sickness and premature death. The occasional explosion of a steam boiler, or a collision on a railway, attended with the loss of 10 or 15 lives, produces a strong sensation throughout the country, and calls forth expressions of the deepest sympathy for the sufferers; but whether a man lose his life by an accident or by fever he is equally killed; the causes productive of epidemic disease being as susceptible of control as the management of a steam boiler, or a railway train.

The average age at death is another mode by which the sanatory condition of a district may be compared with that of others; and though the average age at death for the three classes of gentry, tradesmen and operatives, deduced from 8800 deaths occurring in the borough during the five years ending 1847, is somewhat higher than the average age given by Edwin Chadwick Esq. in his sanatory report, yet it will be seen that the variation is slight for the operatives, and that 8142 deaths only give 19 years and six months as the average duration of life for that class.

The following table will shew the average age at death for the three classes of gentry, tradesmen, and operatives. I have also subjoined Mr. Chadwick's table alluded to above, for the purposes of comparison; and for the operatives I have given the registration districts separately:

Average age at death of the three classes of Gentry, Tradesmen, and Operatives in the Bolton borough:—

No. of Deaths.		
116	Gentlemen and persons engaged in professions, and their families	51 years
614	Tradesmen and their families	27 years and 2 months
8,142	Operatives and their families	19 years and 6 months

Average age at death of those who die under the age of five years and above the age of 21 years, of operatives and their families in the three registration districts; and of tradesmen and their families in the entire borough:—

	Under 5 years.	Above 21	All ages.	
Operatives	1 year and 2 mon.	50	20 years and 9 mon.	Eastern district
	1 year and 2 mon.	50	18 years	Western district
	1 year and 2 mon.	54	19 years and 5 mon.	Little Bolton
Tradesmen	1 year and 3 mon.	53	27 years and 2 mon.	Entire borough

No. of Deaths.	BOLTON UNION—From Mr. Chadwick's Report.	Average Age of Deceased.
103	Gentlemen and persons engaged in professions, and their families	34 years
381	Tradesmen and their families	23
2,232	Mechanics, servants, labourers, and their families	18

The differences observed in these tables are readily explained. The table extracted from Mr. Chadwick's Report was constructed from the deaths in one year only, and the variation in the classes of tradesmen and operatives is not more than might take place from year to year. With respect to the first class, or gentry, &c., many of them, though connected with the borough professionally, reside in the adjoining Out-Townships; and thus the registries of the Out-Townships would shew a greater proportion of deaths of children belonging to the first class. Again there are many deaths in the Borough registries of individuals of advanced age, who, though recorded as gentlemen, had most probably been engaged in trade, and, having obtained a small independency, had retired from business. These considerations will sufficiently explain the discrepancy which exists with respect to the first class, or gentry, and account for the high average age at death of that class in the Borough. Besides the numbers are too small to afford much confidence in the results. The longer average duration of life among tradesmen, as compared with operatives, is due, as will be seen shortly, to the diminished mortality among children of that class, as compared with the mortality among the children of the operatives. The average age at death of all those who die above 21 years of age in each class differs slightly; it being for tradesmen 53, and for operatives 51 years. The following table will shew the proportion per cent. of deaths which take place at the undermentioned ages to total deaths :—

Proportion per cent, of deaths at the undermentioned ages, to total deaths.

	Ages.														
	1	2	5	10	20	30	40	50	60	70	80	90	100	110	
Operatives.	27,22	39,94	51,5	56,35	61,39	68,12	73,95	79,56	85,26	91,8	97,25	99,71	99,93	100	E. Distr.
	28,29	41,6	55 42	60,75	69,35	73,65	79,13	83,98	88,57	94,32	98,08	99,93	99,96	100	W. Distr.
	31,22	42,17	55,33	61,62	67,53	73,47	77,85	82,18	87,22	93,08	97,74	99,71	100	100	L. Bolton
Tradesmen.	19,54	29,31	40,55	4576	51,46	56.35	63,19	74	81,1	91,36	98,53	100	100	100	

This Table is read thus—in the Eastern District, out of 100 deaths, 51,5 were children under five years old—in Little Bolton, out of 100 deaths, 31,22 were children under one year old.

It will be seen from these tables, that Little Bolton does not occupy so favourable a position with respect to infantile mortality, as it does with respect to the proportion of deaths to the population. 55,33 per cent. of the deaths of the operatives are children under five years old. In the western district of Great Bolton, 55,42 of the deaths are under five years, and in the eastern district 51,5 : but we cannot infer from this fact alone that the eastern district is healthier than the rest of the borough, though the rate of infant mortality is regarded as a very good test of the sanatory condition of a district. In the case before us the diminished relative proportion of deaths under five, to the total deaths, is probably due to the ravages of fever, which is known to attack and carry off a greater proportion of adults; children, though more subject to other epidemic diseases, such as scarlatina, &c., enjoying a comparative immunity from the attacks of typhus. Now the eastern district includes those localities which have been subjected more particularly to the ravages of typhus during the late epidemic; and if we could ascertain the population, and compare the deaths with it, we should in all probability obtain a mortality approaching very nearly to four per cent. That this district is not more salubrious than the rest may be inferred from the lower average age of those who die above 21 years old—being for the operatives 50 years; but in Little Bolton, though the proportion of infant mortality is considerably greater, the average age of those who die above 21 years, is 54 years. The enormous sacrifice of infant life is strikingly shewn in the great numbers who die in the earliest periods of life, as indicated by the large proportion who die under one year, and their low average age at death, —not quite four months. In the class of tradesmen the mortality among children is not so excessive—being 41 per cent.; still the condition of this class, compared to the corresponding class in Preston* is worse; the mortality there amongst tradesmen's children on the average of six years, was 37 per cent. of the entire deaths; for the entire Kingdom, for the years 1840-1-2 it was 39 per cent.

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* See Rev. J. Clay's Report.

In order to exhibit in a clearer light to those who may not have paid much attention to sanatory enquiries, and who may be disposed to doubt whether Bolton and other large towns are really so bad as described by writers on Sanatory Reform, I have constructed the following table, which exhibits the proportionate number of deaths out of 10,000, all classes included, which take place at the undermentioned ages, in the district of Ulverstone, the healthiest district in Lancashire, the town of Liverpool, the unhealthiest town in the Kingdom, and the Borough of Bolton:—

Proportion of deaths which occur between the undermentioned ages, to 10,000 deaths in the undermentioned places.

Ages.													
1	2	5	10	20	30	40	50	60	70	80	90	above 90	
1503	587	551	386	617	923	596	580	730	930	1438	1023	143	Ulverstone
2777	1222	1243	534	590	617	551	528	559	850	500	205	20	Bolton
2479	1390	1441	525	390	691	789	677	539	528	367	177	23	Liverpool

The table is read thus—out of 10,000 deaths occurring at each of the before mentioned places, there would be 1,438 in Ulverstone, between 70 and 80; in Bolton only 500 between the same ages—and in Liverpool 367.

From this table it will be seen how closely Bolton approximates to the state of Liverpool, and what an enormous destruction of infant life takes place in the two towns in comparison with Ulverstone. In the first year of life, Bolton shews a worse state than even Liverpool, 2777 deaths out of 10,000 being children under one year old. By casting the eye over the series of numbers in the table, it will be seen how the numbers become reversed. In the earlier ages in the columns for Bolton and Liverpool, the numbers are considerably larger than the numbers in the column for Ulverstone; but at the age from 50 to 60, the numbers for Ulverstone become greater and continue so to the end—the number dying above 80, being in Ulverstone 1166; in Bolton above 80, only 225; and in Liverpool, only 200—the numbers dying above the age of 70 being, Ulverstone, 2604; Liverpool, 567; Bolton, 725.

Thus, the low sanatory condition of the town is conclusively shewn, both by the high rate of infant mortality, and the smallness of the numbers who arrive at advanced ages. Though these facts are sufficient to shew that the chances of life must be considerably less in towns than in rural districts, neither the ages at death, nor the proportionate number of deaths which take place at specified ages afford sufficient data, without a knowledge of the numbers living at the same specified ages, for calculating the probabilities of life. It is evident, therefore, that the data for the construction of an accurate life table, are very difficult of attainment. The system of registration introduced by government, together with the census of the population taken decennially, afford the requisite materials from which a life table, exhibiting the gradual diminution of the sum of vitality, with a very close approximation to the truth, may be constructed. In the fifth annual Report of the Registrar General will be found Life Tables for the extra Metropolitan Districts of Surrey, the Metropolis, and Liverpool; exhibiting the numbers out of 100,000 that commenced their existence together, remaining alive at certain specified ages, and also the expectation of life at the same ages. With a view of including Bolton in the comparison, and thus affording still more certain and conclusive evidence of its true sanatory condition, I applied, through the medium of Dr. Bowring, to the Registrar General, for the requisite data, which he most promptly and kindly furnished, for the construction of a Bolton Life Table. The first table offered, is one in which the annual mortality per cent, of males and females is shewn, deduced from the population enumerated in 1841, and the deaths registered in the same year, except for Bolton, where the deaths are the average of the seven years ending 1844. It will be necessary to state here that these tables apply to the whole Union, and are not like the others which I have given, confined to the borough; the reason is, that in constructing tables of this kind, it is necessary to know both the numbers living at certain ages and the numbers who die at the same ages for the same particular year, or for a period of years, of which the year in which the population was enumerated is the middle one; information which, for the borough alone, could not readily be obtained. It will be seen that, Liverpool excepted, the age from 10 to 15 is the period when the mortality becomes the minimum. In Bolton, the mortality during the first year of life is more than thirty fold the mortality of the entire period, from 10 to 15. The other tables show how many out of 100,000 born together, die during the following intervals of age, and the expectation of life at the same ages.

It will be seen how closely Bolton corresponds with the metropolis in the chances of life after the first year, in which the difference is two years in favour of the metropolis. The probable duration of life is the time that will elapse before one-half of the 100,000 will be dead. In the case of Bolton this will be in about 32 years, but in Liverpool only about seven or eight; in Surrey about 52 years. The mean duration of life is the total number of years which the whole 100,000 will live, divided by 100,000; which, for Bolton, gives 34,94 years as the expectation of life at birth.

The Annual Mortality per Cent. of Males and Females in Surrey (except the Metropolitan Districts), in the Metropolis, Liverpool, and Bolton.

Age.	MALES.				FEMALES.			
	Surrey.	Liverpool.	Metropolis.	Bolton.	Surrey.	Liverpool.	Metropolis.	Bolton.
0-1	15·296	30·944	22·374	22·5556	11·260	25·370	17·875	18·2514
1-2	4·164	17·220	10·443	10·1001	4.444	17·004	9·528	10·5668
2-3	2·794	8.024	4·950	4·8457	2·486	8·818	4·867	4·5682
3-4	1·668	6·186	3·199	3·5489	1·880	5·230	3·245	3·1756
4-5	1·208	5·244	2·037	2·7731	1 906	3·898	2·379	2·4814
0-5	4·896	14·452	8·710	10·7699	4·418	12·790	7·745	8·9147
5-10	1.050	1·676	1·036	1·1549	·904	1·508	1·010	·9251
10-15	·572	·654	·446	·6942	·590	·730	·415	·5669
15-20	·630	·836	·655	·9002	·690	·702	·532	·8696
20-25	·736	1·034	·909	·9701	·768	·882	·646	1·0028
25-30	·790	1·104	·978	1·0073	·830	1·174	.862	1·1124
30-35	·972	1·374	1·131	1·0258	·608	1·474	·954	1·1624
35-40	·896	2·392	1·659	1·0706	1·370	1·906	1·390	1·5768
40-45	1·212	2·038	1·753	1·1725	·816	1·846	1·209	1·3789
45-50	1·552	3·044	2·629	1·7871	1·706	3·700	1·972	1·7665
50-55	1·670	3·478	2·801	2·1636	1·260	2·622	2·013	1·8308
55-60	2·148	5·260	4·635	3·4519	2 912	4·404	3·687	3·1009
60-65	3·256	5·336	5·247	3·7510	2·742	5·280	3·945	3·1912
65-70	5·318	10·338	8·019	6·4483	5·444	8·644	7·125	6·0955
70-75	7·024	8·950	9·943	9·1143	6·422	9·608	8·106	9·2968
75-80	12·004	17·636	17·322	17·1743	11·098	17·350	16·568	16·9104
80-85	19·470	17·208	18·082	22·1678	17·654	20·794	18·338	18·0920
85 90	38·434	16·336	33·224	29·9592	31·122	33·720	31·130	23·3186
90-95	32·034	23·090	33·443	30·2088	48·502	31·314	33·491	33·3048

The Table may be read thus :—To 100 boys living in 1841 at the age of 5 there were 4·896 deaths registered in Surrey, 14.452 in Liverpool, 8·710 in the Metropolis, and 10.7699 in Bolton.

EXPECTATION OF LIFE (in Years).

Age.	PERSONS.				MALES.				FEMALES.			
	Surrey.	Liver pool.	Metropolis.	Bolton.	Surrey.	Liver pool.	Metropolis.	Bolton.	Surrey.	Liver pool.	Metropolis.	Bolton.
0	45	26	37	34	44	25	35	33	46	27	38	36
1	50	33	43	42	50	33	41	42	50	34	44	43
2	51	38	46	45	51	37	45	45	52	39	48	46
3	52	41	47	47	52	40	46	46	52	42	49	47
4	52	42	48	47	52	41	46	47	52	43	50	47
5	52	43	48	48	51	42	46	47	52	43	50	48
10	49	41	45	45	49	41	44	45	49	42	47	45
15	45	37	41	41	45	37	40	42	45	38	43	40
20	42	34	38	38	42	33	36	38	42	34	39	38
25	38	30	34	34	38	30	32	33	38	31	35	35
30	35	27	30	32	35	27	29	32	35	27	32	32
35	31	24	27	28	31	23	25	29	31	24	28	28
40	28	21	24	25	28	21	22	25	28	22	25	26
45	24	18	20	22	24	18	19	21	24	18	22	22
50	21	16	18	18	21	16	17	18	21	17	18	19

LIFE TABLES,

Deduced from the Enumerations of the Living and the Deaths in 1841.

Age.	Living.				Dying in the next interval of Age.			
	Surrey.	Liverpool.	Metropolis.	Bolton.	Surrey.	Liverpool.	Metropolis.	Bolton.
0	100,000	100,000	100,000	100,000	12,229	25,290	16,266	20,482
1	87,771	74,710	83,734	79,518	3,699	11,776	7,964	7,063
2	84,072	62,934	75,770	72,455	2,190	5,079	8,630	3,293
3	81,882	57,855	72,140	69,162	1,489	3,210	2,286	2,325
4	80,443	54,645	69,854	66,837	1,244	2,447	1,525	1,733
5	79,199	52,198	68,329	65,104	3,776	3,987	3,408	3,296
10	75,423	48,211	64,921	61,808	2.159	1,648	1,381	1,914
15	73,264	46,563	63,540	59,894	2,379	1,755	1,856	2,605
20	70,885	44,808	61,684	57,289	2,616	2,096	2,350	2,759
25	68,269	42,712	59,334	54,530	3,710	2,363	2,666	2,817
30	65,559	40,349	56,668	51,713	2,678	2,772	2,875	2,753
35	62.881	37,577	53,793	48,960	3,466	3,829	3,941	3,129
40	59,415	33,748	49,852	45,831	2,936	3,120	3,540	2,839
45	56,479	30,628	46,312	42,992	4.419	4,750	5,003	3,046
50	52,060	25,878	41,309	39,346	3,674	3,657	4,640	3,732
55	48,386	22,221	36,669	35,614	5,752	4,760	6,830	5,381
60	42,634	17,461	29,839	30,233	5,937	4,068	6,041	4,842
65	36,697	13,393	23,798	25,391	8,659	5,020	7,454	6,831
70	28,038	8,373	16,344	18,560	8,003	3,114	5,857	6,852
75	20,035	5,259	10,487	11,708	8.790	2.980	5,985	6,731
80	11,245	2,279	4,502	4,977	6,799	1,437	2,697	3,146
85	4,446	842	1,805	1,831	3,653	581	1,445	1,334
90	793	261	360	497	693	172	293	399
95	100	89	67	98	85	56	58	57
100	15	33	9	41	13	33	8	41
105	2	..	1	..	2	..	1	

Out of 100,000 children born alive in the Bolton Union only 65,104 remain alive at five years old, 20,482 will die in the first year; in the metropolis, 16,266; and in Liverpool, 25,290. There is a greater diminution in the rate of mortality in Bolton during the second year than in the metropolis, and consequently a greater proportionate improvement in the probability of life. We have seen that the rate of mortality, in proportion to the population, is, in the rural districts of the Bolton Union, much less than in the townships of Great and Little Bolton; the life table will, therefore, exhibit more favourable results than are really due to the Borough. The proportion of deaths under five years old to the entire deaths in the Borough, is as high as for Liverpool, exclusive of West Derby; and if the materials for the construction of a Life Table for the Borough alone could be obtained, we should find it much nearer the condition of Liverpool than now appears to be the case. No other comparisons need be made, as the Tables themselves will shew the relative condition of each district.

In all districts, whose sanatory condition is low, there is invariably found a greater proportion of infantile mortality than in more favourable districts; the proportion of births to the population is also higher, and notwithstanding the high rate of mortality, the population is not only maintained in our large towns, but is steadily increasing. It therefore follows, that in the towns there will be a larger proportion of infant and middle age population, and that the argument drawn from the proportion of deaths under five years old, without having reference to the numbers living at the same ages, is, to a certain extent, fallacious; these objections are obviated in the tables here given. By this method a generation is followed through the successive stages of existence, counting them at every step, until the last lingering remnant disappears, after the lapse of little more than 100 years. These tables give results more favourable than other methods have done; thus the average age at death for the Bolton Union, given by Mr. Chadwick, was 19 years; while, by the table, it will be seen that the average age at death, or the expectation of life of 100,000 children born together, is very nearly 35 years; and the probable duration of life 32 years. For all England the mean age at death is 29 years; the true mean duration of life is 41 years; and the probable duration of life 45 years. These comparisons are not quite so startling as those founded upon the mean age at death, and shew that the true expectation of life is considerably more than that given by some writers on Sanatory Reform. There is, nevertheless, sufficient necessity to apply all the resources of modern science and skill to the improvement of the health of towns. Continued investigation may shew that errors have been committed and exaggerated statements made ; but it will also shew that, in comparison to the total amount of evil which really exists, the amount of exaggeration is small, and that the amount of sickness and death due to removeable causes is far from being an insignificant portion of the whole.

The proportion of births to the entire population of the Borough upon the average of 5 years, is 1 in 21,5; in Preston, it was 1 in 26; and in the whole of England and Wales 1 in 32. The greater number of births in proportion to the population in bad districts is partly occasioned by the high rate of mortality among children, and the very early period at which the great mass of them are cut off. Objections have been made to the argument drawn from the high ratio of the births to the population, to prove the unhealthiness of a district, on the ground that the greater number of births may be partly accounted for by the fact, that there is in those towns, or districts, where the number of births is above the average rate, a greater proportion of the population at child-bearing ages, that is between the ages of 20 and 45. This statement may be true, and yet not affect the evidence which the ratio of the births to the population affords of the low sanitory condition of the town. If we refer to the table (page 7) we shall see that in Ulverstone, out of 10,000 deaths, 2604 are individuals above 70 years of age; while in Bolton, out of the same number, only 725 are of persons above the age of 70. This table appears to me to afford sufficient evidence, that in the population at Ulverstone there is a greater proportion of aged persons; or that in Bolton there is a greater proportion of children, and persons at child-bearing ages. This fact will in part, therefore, account for the greater number of infant deaths, because there is a greater infant population; and for the greater number of births, because there is a greater proportion of middle-aged persons. But this explanation, though it may shew that statements respecting the infant mortality of towns, and the increased ratio of births, are to be made with caution, does not weaken the evidence derived therefrom in proof of the unhealthiness of districts where it occurs. To state that there is a greater proportion of a population children and persons of middle age, is only to state, in other words, that there are comparatively few aged people, which is surely proof enough of the unhealthiness of the locality; for the question, why are there fewer aged people in one district than another, can only be answered on the supposition, that in the case of towns there are causes which shorten the period of human existence, accelerating the changes of human life, and seeming to produce a race, the natural term of whose existence extends over a shorter period of years. Thus the only ultimate explanation that can be given of the fact of an increased ratio of births is to be found, first, in certain changes in the character of the population, reducing the average age of the living, which changes are the natural result of an increased annual mortality; and, secondly, in the increased infant mortality which takes place in our large towns, as compared with country districts. The objections which have been here alluded to only bear upon those deductions which have been made from a comparison of the average age at death alone, or of the numbers who die at certain ages, without taking into account the numbers living in each district at the same ages; deductions which have in some instances been to a considerable extent erroneous. They do not apply at all to the life tables which have been given with this Report; for in the construction of those tables the number of the living at each interval of age was known, as well as the number dying; and from these data the mortality for each age calculated separately. And thus it is seen, after making proper corrections for differences of population, that out of 100,000 children born in Surrey, 20,801 die in the first five years; out of the same number born in Bolton 34,896,—20,482 dying in the first year, almost as many as die in Surrey in the first five years.

The great waste of human life which takes place in large towns is not the whole of the evil incurred by a disregard of the laws of health. Where the mortality is increased, the number of cases of sickness will also be increased, and an additional burden of expense and suffering laid upon the community; especially upon the poorer classes, who are the most exposed to the influence of the causes of sickness and death. The ratio of the cases of sickness to the deaths is variously estimated by writers on Vital Statistics and Sanatory Reform. Dr. Lyon Playfair estimates the ratio as 28 to 1, or for 1 death 28 cases of sickness. In the "Contributions to Vital Statistics," by Mr. Neison, it is found that the experience of Friendly Societies in England and Wales gives 167 week's sickness to one death. If we suppose each case to be one month in duration, which is probably a long average, we have 40 cases of sickness to one death. The experience of the London Hospitals, and of the Manchester and Liverpool Infirmaries, gives a lower ratio. St. Bartholomew Hospital gives one in 14; the Lock Hospital, about one in 10; the Manchester Infirmary, one in 16; the Liverpool Infirmary, one in 22; and the Bolton Dispensary, about one in 20. The experience of the London Hospitals can scarcely be supposed by any one to represent the true ratio of sickness to mortality. The medical and surgical cases admitted to these Hospitals are in general the severest forms of disease which occur in the practice of the private surgeon. The mortality in the Lock Hospital is higher than it was in the Fever Shade of this Borough during the late severe epidemic. The experience of the Bolton Dispensary is likely to afford as near an approximation to the true proportion of sickness for this Borough as we are likely to obtain; and if this be assumed, we have 35,960 cases of sickness per annum; and if we suppose that the sickness can be diminished in the same proportion as the deaths, by proper sanatory arrangements, we must admit that 14,700 of these cases of sickness are due to removeable causes,

It will be seen that the high rate of mortality in towns, in comparison to rural districts, is due chiefly to the greater prevalence of epidemic diseases. The greater density of the population, and the consequent greater accumulation of animal and vegetable refuse in large towns, not only tends to generate fever and other epidemics, but affords also a greater chance of their ravages extending more widely by contagion. The number of deaths due to contagious diseases, compared to the total deaths, will afford sufficient evidence of the greater liability of a town population to the ravages of epidemic disease; for though, as will be seen shortly, some particular contagious disease may be committing extensive ravages in one township, while an adjoining township is comparatively free, yet by taking the whole class of epidemics, and extending the comparison over a period of years, there can remain little doubt as to the correctness of the results. The following table shews a striking difference in the liability to attacks of epidemic or contagious diseases of the population of Ulverstone, as compared with Bolton and Liverpool, and will shew that there is a greater liability on the part of the town population to the ravages of contagious diseases; and from this greater liability we infer a greater uncertainty of life.

Place.	Deaths from Epidemic in every 10,000 Deaths.
Ulverstone	1176
Liverpool	2296
Bolton Union	2198

Calculated from the Registrar-General's Reports.

It will be seen, that in the ratio of epidemic diseases Bolton corresponds very closely with Liverpool; and that in each of the towns the proportion of deaths from the forementioned diseases is almost double that which obtains for Ulverstone. The number of deaths which occurred in the Borough from typhus, for the four years ending 1846 was 259, or 65 annually; if we suppose that for one death there are 15 cases of sickness, the number attacked annually will be 975, or one in 54 of the population. The year 1847 was excluded on account of the ravages of fever amongst the fugitive Irish, and in those parts of the town where they took refuge, rendering the year one of extraordinary mortality, from this cause; and, therefore, calculated to to give a higher average of deaths from fever, if associated with other years, than is really true. Dr. Duncan, in his valuable Report, gives a table of the number attacked by fever in seven districts of Liverpool. In the best district the number of cases, in proportion to the population, was one in 237; in the worst district, one in 32; in the Borough of Bolton we have one in 54. There are no means of separating large districts in this town, with the view of shewing the greater prevalence of fever in those that are badly cleansed, or crowded with a dense population, as has been done by Dr. Duncan, in his investigation of the state of Liverpool; but the greater frequency with which the names of King-street, Back King-street, Spring Gardens, Howel Croft, Cross, and Back Cross-street occur in the registers, is sufficiently indicative of the condition of those districts where fever has its chief abode. In the year 1847 this town, like most other towns in Lancashire, was the seat of a severe affliction of typhus, owing to the influx of the Irish. Its ravages were, however, confined principally to them. From the testimony of a surgeon in extensive practice in this town, it would appear that, amongst the other classes of the population, there had not been any extraordinary increase in the number of cases of fever; and that, in his own practice, he had not found any great deviation from the usual number of cases. The Irish, driven by famine and pestilence from their native country, are no sooner attacked by sickness, than they are reduced to extreme destitution, and become chargeable to the parish. It will be seen, from the experience of the fever ward, to what an extent the township of Great Bolton has suffered from fever and destitution, in comparison to Little Bolton and the out-townships; and though, unfortunately, no account was kept of the proportion of Irish patients during the time when the fever raged most violently, and the shade was crowded with patients, yet the fact that Great Bolton contains the districts where the Irish usually resort, together with the striking disproportion between the number of cases furnished by Great and Little Bolton respectively, together with the testimony of the Union surgeon, relative to the condition of New-town, is sufficient evidence even to one not personally acquainted with the locality and progress of the late severe attack of typhus, that the Irish wère the principal sufferers, and sufferers to an extent that the great bulk of our townsmen are very far from imagining. Previous to the erection of the fever shade, one of the Union surgeons had, during the Summer months, as many as 130 or 150 patients under his care at one time, in Cross-street and Back Cross-street. The population of these streets will not be more than 1000, so that, at the least, one-eighth of the entire population was under his care at one time. The subjoined table will shew the proportion of cases due to each township of the Borough, and by the out-townships collectively:—

	Admitted	Dead.
Number admitted from Great Bolton . .	426	—
,, ,, Little Bolton . . .	21	—
,, ,, Out Townships . . .	40	—
Number admitted under 7 years old . . .	63	7
,, ,, under 15 and above 7 . .	69	1
,, ,, above 15	355	38
Total number admitted	487	46

From this it will be seen that the mortality is a little less than 1 in 10. There is another point upon which the experience of the fever shade gives additional evidence: viz., the greater chance of recovery which patients under 15 seem to have over those above that age. The number admitted under 15 years of age was 132, of whom eight died, or six per cent.; the number admitted above fifteen was 355, of whom thirty-eight died, or 10,6 per cent. The numbers are too small to enable us to ascertain the respective chances of recovery at each age, but the result is, nevertheless, interesting, as shewing that the disease is far more fatal to those who are in middle age; and that typhus is, especially, the disease that produces widowhood and orphanage. The experience of the London Fever Hospital has, however, shewn that typhus is not only more fatal to adults, but that they are more liable to be attacked. Dr. Southwood Smith has stated "that the number attacked between 20 and 30 years of age nearly equals in number those of all other ages put together." He further adds, "that the risk of life from this malady is twice as great at the age of 31 as it is at 11;" and that "the number of persons who actually perish by this disease at the adult age, and in the meridian of life, is far greater than at any other period of existence." In allusion to the prevalence of fever amongst persons of middle age he further states, "that of all the acute diseases which cut short this, the most precious part of the term of existence, and the only part of that term which it is in the power of human precaution and wisdom to extend indefinitely, fever is, incomparably, the most prevalent—so prevalent, indeed, that it may be said to be the disease of adolescence and manhood."* It is, therefore, a matter of the highest interest and importance, that those causes which are known to produce fever should, as much as is possible, be removed, not only in mercy to the poor, who are more peculiarly exposed to its ravages, but as a matter of economy. The pecuniary burdens thrown upon the parish in the maintenance of widows and orphans, or in giving relief to families impoverished by protracted sickness, are, doubtless, much more than would be incurred by very efficient means of prevention.

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* First Report of the Health of Towns Commissioners, Vol. i. p. 6 and 8.

The numbers who perish from consumption are considerably more than from fever. On the average of four years, ending with 1846, 149 died annually. It would appear that, with respect to consumption, the Borough is in a better condition than the out-townships. The number of deaths from phthisis in the whole Union was, in the years 1841-2, 856, or 428 annually. In the Borough 149 die annually, which leaves 279 as due to the out-townships, whose population is less than the population of the Borough. A part of this discrepancy may be accounted for by the supposition that, in the Registrar General's Reports, those children who are recorded as having died of decline are included. In the estimate for the Borough no children were taken into the account, except those whose death from pulmonary consumption was certified; still, after all allowance is made for this cause of difference, there remains sufficient evidence that the town population is not so liable to consumption as the country population—a result very different to what we had anticipated, and strikingly at variance with the supposition that the cotton manufacture, and the nature of the employment in cotton mills, tends to develope this formidable disease. A distinguished Frenchman (Dr. Villerme) undertook an investigation of the influence of the cotton manufacture upon the health of those employed therein; the result of his enquiries was, that a portion of the work people, viz., those employed in batting, were found to be subject to a disease of the lungs, which, "in the process of its development, assumed all the characteristics of consumption, and the medical men resident in the manufacturing districts called it cotton consumption." The pale complexions of those engaged in the carding and spinning rooms, and which is due to the high temperature 80°, or thereabouts, which is maintained, would also lead a stranger very readily to believe they were disposed to consumption. Where the process is such as to subject the operative to the inhalation of dust and "flyings," injury is done to the lungs, and thus those who have been employed for a number of years in card rooms become, in many cases, subject to asthma. Batting is almost, if not altogether, abolished in the cotton manufacture in this country; and the process of cleaning and breaking up the raw material, which is most inimical to health, is in most mills carried on in a separate room, and employs an exceedingly small proportion of the total number of hands. The mills of modern construction are also much superior with respect to the loftiness of the rooms and means of ventilation; so that the condition of the factory operative is, as far as health is concerned, much superior now to what it was 20 or 30 years ago. With the exception of carders being more subject to asthma, and which disease may in them exhibit characters similar to the cotton consumption of the French surgeons, I feel certain, that the factory operatives themselves are unaware of any peculiar tendency to pulmonary consumption, or any other disease of the lungs or chest. The causes which produce tubercle in the lungs are to be found rather in the condition of their dwellings, with respect to dryness, warmth, and an abundant supply of air, in all which particulars they are much inferior to the condition of the rooms in which they work; and also in the irregular and intemperate habits to which, unfortunately, so many of the labouring classes are addicted. The breathing of impure air, though it may not be loaded with dust, is known to tend powerfully to the production of this disease. Sir James Clarke, according to the testimony of Dr. Duncan, has actually succeeded in inducing consumption in rabbits, by confining them in a cold, dark, damp, close situation, and supplying them with innutritious food. Dr. Clarke states * that "if an infant born in perfect health, and of

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* Cyclopœdia of Practical Medicine, Vol. iv. p. 320.

the healthiest parents, be kept in close rooms, in which free ventilation and cleanliness are neglected, a few months will often suffice to induce tuberculous cachexia;" and that "there can be no doubt that the habitual respiration of ill ventilated and gloomy alleys in large towns is a powerful means of augmenting the hereditary disposition to scrofula, and even of inducing such a disposition *de novo*." The same eminent authority also bears the following testimony to the influence of spirit drinking in producing the same disease. "Among the causes of tuberculous cachexia, a free indulgence in ardent spirits holds an important place; while it is one of the most powerful means of debasing the morals, and of extinguishing the best feelings of human nature, this pernicious habit is no less effective in destroying the physical constitution. We believe that the abuse of spirituous liquors among the lower classes in this country is productive of tuberculous disease far beyond what is usually imagined. Indeed it is only necessary to observe the blanched cadaverous aspect of the spirit drinker, to be assured of the condition of his internal organs. The tale of his moral and physical degradation is indelibly written on his countenance: nor does the evil rest here—he not only destroys his own health, but entails on his unfortunate offspring the same disposition to tuberculous disease." Now both these causes are in operation, to a great extent, amongst the working classes of this town. The condition of their dwellings with respect to ventilation light, and the means of cleanliness is bad, while the habits of the working classes are the reverse of temperate. There is no doubt but that the operatives in this town and the immediate neighbourhood spend £1000 per week in spirits and malt liquors; and those whose habits are irregular, are generally found occupying the worst localities, and paying the least attention in their domestic arrangements to the rules of cleanliness and health. That spinners and carders are not more subject to consumption than the rest of the operatives, is evident from the proportion of deaths from this disease which occur amongst them, in comparison to the entire deaths from the same disease. Out of the 595 deaths which occurred in four years, 56 only were recorded as spinners, piecers, or card-room hands: the number of spinners, &c. employed is about 5000, so that only one in 357 die annually from this disease—a smaller proportion than for the rest of the population. From these facts I think it will appear that there is no just ground for supposing that employment in the cotton mills tends to produce this disease; but its causes are to be found rather in the habits of the people, and in the condition of their dwellings. The statements that represent the operatives as crowded together in the mills, are necessarily incorrect. The nature of the machinery is such as to render it impossible to crowd them together in anything like the same manner that the tailors of London or the file cutters of Sheffield are. There is, however, another effect generally attributed to mills, and, perhaps, with greater justice, and that is the premature development of young persons, especially females, and the induction of a premature old age. It is somewhat doubtful how much of the former effect is due to the factory system, and how much to the state of the public morals. No very striking difference can be observed in respect to development between those females who are employed in mills, and those who are not; and it is well known, that a low state of public morals has the effect of producing early development. With respect to the latter part of the charge, there will be, I think, little difference of opinion amongst those acquainted with the condition of spinners, and having had opportunities of observing them as a class for a number of years. An old spinner following his employment is a rarity; and though many of them have to leave spinning on account of impaired eye-sight, they in general appear more decrepit and feeble when they have got beyond 40 years of age, than individuals of the same ages belonging to other classes of operatives.

The diseases to which the high mortality of children is due, are scarlatina and other epidemics, teething and convulsions. The causes which operate prejudicially upon adults, operate with increased force upon the frail constitutions of infants, and produce a mortality which associates in our minds rather with the slaughter of the battle field, than with the natural operation of physical causes, productive of disease. We have seen, that out of 100,000 children born, 20,000 die in the first year of existence; and if this be so for all classes of the community,—when the children of the middle and wealthier classes, who are tended with care and solicitude, as well as the children of the poor, who are frequently and necessarily left to be tended by children little older than themselves, are included in one general average,—it is easy to conceive that the chances of life for the children of the poor are low indeed, The greater number of deaths under five years old, in proportion to the total deaths amongst the working classes, and the lower average age at death of the operatives, compared to the middle class, sufficiently indicate that the ravages of disease and death amongst the children of the poor must be much more extensive and severe. The mortality is greatest during the earliest periods of life. The average age of all who die in the first year of life, amongst the working classes, is not quite four months. Scarlet fever, measles, small pox, and hooping cough, destroyed 922 lives in four years. The subjoined table will shew the periods when these diseases were most fatal :—

	Scarlatina.				Small Pox.				Measles.				Hooping Cough			
	1843	1844	1845	1846	1843	1844	1845	1846	1843	1844	1845	1846	1843	1844	1845	1846
Eastern District..	9	12	55	67	0	9	20	2	20	5	19	27	13	24	7	15
Western District .	11	10	106	70	0	18	11	0	25	5	27	17	26	24	2	10
Little Bolton	3	15	11	82	0	7	12	1	29	5	11	23	16	17	2	22

There was a slight diminution in the number dying of measles in 1844-5; but in those years small pox was epidemic, and destroyed 77 lives. The registers afforded melancholy evidence of the little value put upon infant life, and the utter recklessness of the ordinary means of preserving it. Out of the whole number (80), who perished in three years, 68 had never been vaccinated; and out of 29 who died in the western district, not one had been vaccinated. This would lead us to conclude that the excessive mortality amongst children is intimately connected with the character of the parents. It is reasonable to suppose, that if parents thus neglect the commonest precautions, they must either be profoundly ignorant, or, what is worse, deficient in natural affection; and if parents do not, or will not avail themselves of the means of preserving their children, they ought to be compelled, by attaching a penalty to their neglect. Other evidence of negligence was found in the fact, that many children, whose deaths were recorded, had had no medical attendance. The plea of poverty may be urged, but can scarcely be admitted. Through the medium of the Dispensary and the Union Surgeons medical relief is tolerably easy to be obtained; and when we see that a child is allowed to be sick for several days of small pox, and die without medical assistance, we can scarcely help attributing it to negligence rather than inability. I am afraid that these facts point to a great social evil amongst us, and that, notwithstanding the proverbial affection of a mother for her offspring, there is a great indifference to the preservation of infant life. Nor do I think that poverty is the sole or even the principal cause of this indifference. Neglect is far more likely to be found in the families of the improvident and intemperate: besides, medical relief may be obtained by the poorest, if sought after, and without charge. The epidemic character of scarlet fever is strikingly shewn in the foregoing table. For the years 1843-4 the deaths are few, but in 1845 they rose in Great Bolton from 22 to 161; and in the Western district alone the disproportion was still greater—being, in 1844, 10, and in 1845, 106; and yet, during this year, the deaths in Little Bolton, from this disease, were four less than the year preceding. In the following year, however, the disease passed over the river, and the deaths rose from 11 to 82; and yet, with these astounding facts before our eyes, there are some men who seem to think that the outcry of Sanatory Reformers is unnecessary, and that things may very well remain as they are. The total number of deaths from teething and convulsions in four years was 978, or 244 annually.

The annexed table shews the proportion dying in each township of the Borough, and also the proportion in Leeds, Manchester, and Liverpool :—

Places.	Deaths from Convulsions and Teething, per Annum.	Proportion to Population Annually.
Leeds	600	1 in 281
Liverpool	976	—— 228
Manchester	938	—— 205
Great Bolton...	148	—— 248
Little Bolton...	96	—— 179

The deaths in the three towns of Leeds, Liverpool, and Manchester, are the average of the two years 1841 and 2. The deaths in this Borough are the average of four years, ending 1846.

In this table Great Bolton contrasts favourably with other towns, while Little Bolton is at the bottom of the scale. It will be remembered, that though Little Bolton presented a rate of mortality considerably lower than Great Bolton, the proportion of infant deaths was greater, which is here shewn to be due in part to the greater prevalence of convulsions. The practice of drugging children, even in the earliest periods of infancy, with opiates and with gin, and the improper food which is frequently given them, are the chief causes of death by convulsion. A considerable amount of evidence has been laid before the public relative to the practice of administering cordials, and the extensive mischief which results therefrom; and though only a few facts could be obtained in this local enquiry, they will be sufficient to shew that Bolton presents no exception to the general practice. A respectable druggist, who has for many years done business to a considerable extent with the poorer classes, informs me that the general allowance was half an ounce per day of Godfrey's cordial; and his lady further stated, that she remembered one case in which one ounce per day was given. Nor is this the whole—the cordial itself is further strengthened by laudanum, several drops being put into each half ounce; while in many instances laudanum itself is procured, and opiates manufactured by themselves. It is to be expected that in some cases the dose will be too strong, and immediate death will be the result. Several cases were found in the registers of death from this cause, and in one instance the opiate was mingled with gin. These facts present a lamentable picture of parental ignorance and domestic mismanagement and misery. The children accustomed to these opiates become uneasy and restless when deprived of their accustomed stimulus, and unconscious of the evil effects produced by them, receive with avidity the drug which destroys their life; so much so, that when they enter with their mothers into the shop for the purchase of cordial, they will stretch out their hands with eagerness and impatience.

The excessive waste of life which takes place from year to year in the Borough, is not equally distributed over every portion of the town; the rate of mortality is intimately connected with the condition of the population with respect to the quality of their dwellings, the cleanliness of the streets, the condition of the drainage, the density of the population, the supply of light and air, and the regularity of the habits of the people. We have seen that in Little Bolton, though the mortality is very high, (2,82 per cent annually), it is nearly one per cent. lower than Great Bolton.

Out of 10,000 inhabitants in Great Bolton, eighty-four more will die every year than out of the same number of inhabitants in Little Bolton. This diminished mortality can only be accounted for by the superior condition of the township with respect to sewerage, the greater proportion of unbuilded area, owing to a considerable proportion of Little Bolton being of recent construction, and perhaps, also, from the greater proportion of persons of the middle class; but in this respect there is no very great difference in the two populations. Their command of the necessaries of life, and the nature of their employments, are pretty much the same. The drainage of Little Bolton is far from deserving the title of a system; it has not been constructed upon any comprehensive plan, and there are many streets whose drainage the trustees apparently take no account of whatever. Though the construction of sewers has not been upon any regular and scientific system, yet owing to the natural facilities arising from the declivity of the township, thus preventing any serious blunder in fixing the levels, the drainage, though still defective, is much superior to that of Great Bolton. In the latter township drainage can scarcely be said to exist. There are few instances where house drainage exists at all, the general plan being to allow the water used for domestic purposes to be thrown in the channel, or open gutter, and there to wend its sluggish way along to the next gully hole, about twenty or thirty yards distant. The evil is further aggravated by many streets remaining wholly or partially unpaved; for it is not unfrequently the case that a number of houses are situated apart from the rest—a portion of unbuilded area intervening, and the drainage of these houses, owing to the absence of soughs, has to run along the street a distance of 50 yards. A portion of the channel is unpaved, and the water softening the earth as it runs over it, converts it into a long straggling pool of stagnant mud; this then stays the passage of the water until the inhabitants rake out the mud; the channel fills up again, to be again raked out, and thus the process continues. The management of each township in matters concerning the public health is vested in trustees, one body of trustees governing each township. The trustees of Great Bolton are self elected, and govern the township under the provisions of an act obtained in 1792, and further amended in 1817; this act was for "widening, paving, lighting, watching, cleansing, and regulating the streets, lanes, passages, and places within the towns of Great and Little Bolton; and for supplying the said towns with water." For this purpose the trustees were empowered to enclose, divide, and allot a certain common, or waste land, called Bolton Moor; the allotments of this Moor now yield an annual rental to the trustees of £2,400; but as they have some interest of monies borrowed on mortgages to pay, this sum is reduced to about £2000. Besides the receipt of this sum they are empowered, or at all events the act professes to empower them, if their necessities require, to levy a rate upon the occupiers of messuages, houses, &c.* not exceeding in the whole the sum of two shillings and sixpence in the pound in any one year. This rate would enable them to raise £11,000 per annum, which, with the sum derived from Bolton Moor, gives them the command of £13,000 per annum; besides which, they have power to borrow to the amount of £10,000. It is now fifty years since this act was passed, so that in enquiring into the efficiency of local irresponsible government, no objection can be raised on the ground that time enough has not been allowed, in order to shew what can be done. The act in providing for the paving of new streets is defective, not giving the trustees power to compel the owners of property to pave those streets in which their property is situated—the new streets not coming under the direction of the act until they are paved—hence parties take advantage of the omission, and there are streets that have been streets for forty or fifty years, which are wholly or partially unpaved. For this, however, the trustees cannot justly be held responsible; but it affords a good reason for superseding an act which allows such abuses to exist, even supposing its other provisions had been faithfully executed. But the condition of the other streets which are paved, even the best of them, if they be subjected to much traffic, is such as to reflect little credit upon any community making pretensions to scientific knowledge or mechanical skill. Our large thoroughfares are constantly undergoing repair, and are constantly bad; while some of the private streets are so deplorable that it is almost impossible for them to become worse. Amongst the worst, Middle street, Moorlane, perhaps stands preeminent: the broken and irregular condition of the pavement, the loads of mud with which the surface is covered, varying in consistency according to the state of the weather, makes the crossing of this street in rainy seasons a somewhat hazardous exploit. The dirt has been occasionally scraped into heaps, several of which, from two to three feet in height, are ranged on each side. The street is about 100 yards in length, and will have at the present moment several tons of scavenger's manure upon its surface. There are others not so bad, but still with a surface exceedingly irregular and broken. Such a condition is the natural result of the system of paving which is still pursued. Large blocks of soft sand-stone are usually employed in the principal thoroughfares, in some cases irregular boulders are employed; the sand-stone rapidly wears away, and wears unevenly; the boulders cannot be laid with sufficient firmness, and are subjected to greater jolting, and some of them sink below the others—hence the road immediately becomes uneven, a number of hollows are formed, in which the rain and sediment collect; and thus, after a shower, the street, instead of presenting a clean washed surface, becomes a panorama of mud and stagnant pools. Such is the unexaggerated condition of all our principal streets and thoroughfares, and the description is almost equally applicable to Little as to Great Bolton. The act requires that the trustees shall cause all streets, lanes, and places to be well and sufficiently swept twice in every week, and the dirt, &c. carried away; and shall give notice in every court, passage, &c. of the approach of the scavenger's cart, so that the inhabitants may bring forth their ashes, rubbish, &c. to be carried away. It further provides, that privies shall not be emptied, only between the hours of ten at night and five in the morning; neither of these provisions is executed. The greater proportion of the streets remain unswept for months together; no efficient means of cleansing are provided, and all that is done is the occasional employment of paupers, and the use of one of Whitworth's machines. There is no entry in the trustees' accounts of any expense incurred in cleansing the streets, with the exception of the expence of maintaining Whitworth's machine; but some idea may be formed, from the quantity of manure disposed of by the trustees, of the extent and efficiency of their arrangements for cleansing the Borough. In the year 1847 the amount received for manure was £24 3s. 3d. and in 1846 £1 14s. 11d. The amount expended in cleansing Edinburgh is £12,000, and the manure realizes £10,000 per annum. In the trustees' accounts for Little Bolton there is no indication of any expense whatever being incurred in cleansing the streets; the matter being, I suppose, too insignificant to appear as a separate item. The act of Great Bolton empowers the trustees to construct sewers of such magnitude, form, and material, as may seem best to them; thus apparently conferring ample powers for the establishment of a complete and efficient system of drainage. But such has been the neglect of the trustees in the management of this important matter, or the defectiveness of the act, that a worse condition of sewerage can scarcely be conceived to exist than that in Great Bolton. The sewers have apparently been constructed simply to meet the exigencies of the moment, or to suit the necessities of a few houses, and have had little prospective reference to the increase of the town; thus in many streets the sewers are much too small, and when a thunder storm occurs, they are unable to carry off the water with sufficient rapidity. The streets are flooded, the filth of the gutters conveyed by the flood chokes up the mouths of the soughs, and increases the evil, and a constant source of annoyance and discomfort is thus provided for the inhabitants through the blundering of unskilful and negligent management. The inhabitants of cellars, especially, are subjected not to annoyance merely, but to positive hardship. When the soughs are choke full, and water lodging in the street, a pressure in the interior of the sough is produced; so that when a sough exists in the cellar, the water boils up like a fountain, and the dwelling is flooded to the depth of 18 or 20 inches. Sick people have to be carried out of bed in the arms of their neighbours to escape being drenched; and when the water subsides, a thick layer of mud is left upon the floor. The form, as well as the magnitude of the sewer, is bad: they are generally square, built mostly of rubble, rough, uneven, and full of crevices. The sewer water stagnates, and deposits most of the solid matter it held suspended; the sough, therefore, gradually chokes up, and becomes useless, until at considerable labour and expense the pavement is taken up and the sough cleansed. The form of the sewer is not altered, the pavement is relaid, without any sufficient precaution being used to prevent a recurrence of the evil. Thus the process of choking up proceeds again; it is again cleansed, and so the series of changes goes round. The soughs seem to be constructed to collect the drainage rather than to convey it away, and to afford a refuge for rats. There are also many streets which are entirely destitute of sewers; at least there are none of which the inhabitants are aware. The water lies in the channels to be evaporated by the heat of the sun, or sink into the earth; or, as the inhabitants say, "go away, they don't know how." There are no means of ascertaining from official documents or plans the extent of the sewers which do exist, or their position or level, or any thing else. From all that I can learn, no plan whatever exists in Great Bolton. A person informed me, that, intending to have drains connected to a number of dwellings, he was wishful to ascertain the position of the main drain in the street before taking up the pavement. This information he could only obtain from a superannuated paviour, who remembered to have seen it, and was able to indicate the spot; and this method was the only one by which the Government surveyors were able to obtain any information of the position of the sewers—an old paviour being sent round with them; so that the most authentic source of evidence upon the subject that can be obtained is founded in part, at least, upon tradition. In circumstances like these it is difficult to institute any comparison of sewered and unsewered streets. The whole is bad, even the best; for where sewers do exist, owing to their defective construction, the inhabitants are far from deriving the full benefit of good drainage. Thus a system of works, involving the outlay of several thousand pounds, is suffered to grow up, as if by chance, without any scientific supervision; and instead of having a consistent and comprehensive plan, conceived and executed by a competent engineer, we have a system of patchwork, conceived by a thousand minds swayed by ignorance, interest, and caprice. In laying these statements before you, I do not wish to cast any reflections upon any trustee; they are all of them, for anything I know to the contrary, men of honour, integrity, and public spirit. Apathy and indifference upon the subject of the Health of Towns has not been exclusively the fault of trustees. Public attention has only been recently directed to this subject, and even now great numbers are only awakening to its importance; but no excuse can be offered for endeavouring to maintain things as they are. The lives and health of the people should not be sacrificed in order that any body of men may continue to govern the town under the provisions of a defective act; and surely 50 years is long enough to shew whether the powers they possess are sufficient to enable them to accomplish the object contemplated by the act. That the town is dirty, and unhealthy in consequence of the filth, cannot but be the opinion of every one competent to form a judgment in the matter; and every unbiassed mind must see that there is no hope of amendment under the operation of the present defective act. The funds of the trustees are absorbed in lighting the town and repairing the roads; for it appears as though they were unwilling or unable to raise money by levying a rate. The attempt to do so would be exceedingly unpopular, owing to the trustees being self-elected; and so they make the receipts from Bolton Moor to serve their purpose. These suffice to light and pave the town as it is at present done, and all other matters are neglected. In such circumstances it is no wonder that the paving and cleansing of Great Bolton should be so defective, limited as the powers of the trustees are. No inconsiderable portion of the township remains without supervision of any kind; the sewerage is in consequence an irregular and disjointed fabrication, so that, in all probability, a very small portion of the sewers of Great Bolton will be found fit to be incorporated with such a system of drainage as the health of towns requires, or the advancing intelligence of the people upon this subject will demand. It will be found that the vast sums expended during a considerable number of years, both by trustees and owners of property, has been expended to little purpose; and that any future board of health, in constructing sanatory works, will have to commence in this respect *de novo*.

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* "An Act for inclosing, dividing, and allotting a certain Common or Waste Ground, called Bolton Moor, and other the Commons and Waste Grounds within the Township of Great Bolton, in the County Palatine of Lancaster; and for widening, paving, lighting, watching, cleansing, and regulating the streets, lanes, passages, and places within the towns of Great Bolton and Little Bolton, and for supplying the said Towns with water, and for providing fire engines and firemen, and for removing and preventing nuisances, encroachments, and annoyances, and for licensing and regulating hackney coaches and chairs within the said Towns."—32 *Geo.* III. 1792.—p. 46.

The Little Bolton trustees, who are elected by the ratepayers, have no plan of their sewers properly so called; those sewers which the trustees have constructed, or accepted, are indicated upon the plan of the township, by a brown line being drawn in those streets where they exist; but there is nothing to indicate their relative levels or capacity. These important matters are not recorded in any official documents, and the knowledge exists simply in the memory of a few individuals. No great mischief can result at present, it is true, owing to the rapid fall which most of them have, and the short distance they have to run; but the system is lax and defective, and if the town should enlarge much upon the level parts on the north, would, in all probability, lead to expensive mistakes. Many sewers have also been constructed by private individuals, and of course have been constructed with reference to their own immediate wants, without much prospective reference to extension. A, builds a few houses, and constructs a drain; B, shortly after builds a few more adjoining and constructs a drain, which A for a consideration allows to be joined to his drain. Thus a sewer, originally intended for ten houses, may come to be used for 50 or 60: when the sewers come to be revised, these will be found useless. The act of Little Bolton was obtained in 1830, and gives the trustees compulsory powers to enforce the paving and soughing of private streets. There are few unpaved streets, and the sewerage is much better than in the adjoining township of Great Bolton. The trustees of Little Bolton levy rates, and raise in this manner about £3000 per annum, which is chiefly expended upon the highways. Several important sewers have been constructed during the last six years, the principal one being 3 feet 9 by 2 feet 8, and half a mile long. There are also several others of minor dimensions, which the trustees have laid down during the same period, having curved bottoms and being of superior construction. So far the drainage of this township contrasts favourably with that of Great Bolton, and we have seen the good results in a lower annual mortality.

It was not to be expected that while public works were being constructed in the unscientific manner in which they have been, that much attention would be paid to sanatory conditions by builders and owners of cottage property. There is no building act for any part of the Borough, and it is only through the medium of those who hold the land, who may introduce conditions into the leases they grant, that any restriction can be imposed upon the builder. Thus every one follows his own whim, the oddest caprices of architectural taste are gratified, every one does as he likes with his own, and so the town has become a motley assemblage of ill-constructed dwellings and irregular streets. Uniformity and symmetry, the principal elements of structural elegance, are almost unknown in this town. In Deansgate, the principal street of the town, it would be difficult to find three houses or shops standing together that do not differ, either in height, form of the front, projection into the street, or in all three. Within the last few weeks a shop on the south side of the street, projecting most inconveniently into the footway two feet further than the shops on each side, has had its front taken down and rebuilt in the same place; thus, whenever the nuisance is abated, as it no doubt will be, the money expended in this alteration will have been money thrown away. Considerable sums of money have been thus expended during the last few years. Had there been a plan made twenty years ago for the remodelling of the street, and power to enforce compliance with it, at the same time giving compensation to those whose fronts would have to be set farther back, a considerable advance might by this time have been made towards uniformity and elegance, and due entirely to the voluntary efforts of the owners to improve their own property; for had the alterations been made upon one uniform plan, the evident superiority of the altered buildings would have acted as a strong inducement to others to follow the example. There are two instances where the alterations have been decided improvements: the construction of Crown-street, where Pepper Alley used to be, and which was one of the worst spots in the town, is, both in its conception and execution, such as we should desire, with the exception of some places behind; the other is the removal of the old White Lion, and the spacious opening made at the junction of Moor Lane, with Deansgate. In constructing the dwellings of the working classes there does not appear to have been much attention paid to preserving the health of the tenants, the general plan being the back to back principle, without any provision being made for ventilation; indeed, with the exception of a few private residences of the gentry, the houses of all classes depend for ventilation upon the fire-places, and the windows alone; hence, where the houses are built back to back, the air necessarily stagnates and becomes loaded with impurities, the evil being still further increased by the ignorance and prejudice of the inhabitants leading them to stop up every crevice, lest they should be exposed to draughts. A considerable proportion of the cottage property of the Borough has been erected by mill owners, for the use of the hands employed by them. Most of the houses erected by them are of this description, and shew in several other respects great indifference to the health and comfort of the tenants. In some instances they compel their workpeople to take them, who, however much they may dislike the dwelling, have no redress. This mode of proceeding, on the part of the employer, is either unnecessary or unjust; for if a greater rent were not demanded than the houses are worth, tenants could be obtained without compulsion, and to exact an exorbitant rent is dishonest. But the practice of building houses back to back, though the evil of such a mode of construction has been repeatedly pointed out, still continues, and in some instances apparently without any reason. Most houses built in the manner alluded to have only one room on a floor, and are evidently so constructed to save ground rent; but many houses built latterly having two rooms upon a floor, are perversely constructed upon the same vicious plan: the two apartments range parallel to the street, so that the wall which separates the rooms in front from those behind, is entire throughout, and a draught of air through the building is an impossibility.

In many parts of the town, particularly the parts behind Deansgate, Churchgate, and Bradshawgate, and the portion of Old Acres abutting upon Bradshawgate, the houses are old and many of them decayed, with latticed windows, low ceiling, and the usual inconveniences of ancient dwellings. Many of them are situated in yards, which are generally filthy, containing pigstyes, middens, and all the accumulated refuse of the surrounding dwellings. These places are, for the most part, entirely neglected. Hidden from public view by the front houses of the street, and offering no thoroughfare to the passengers, they are seldom entered, except by the inhabitants themselves, or it may be by the Relieving Officer or the Union Surgeon.

Though the town throughout presents a dirty appearance, and is perhaps more uniformly unhealthy than most other towns, yet there are many spots such as these, which sink below the average in filth, and which are known as the nests of fever and other epidemic diseases. Some of these are between Deansgate and the river; and notwithstanding their proximity to the river, and the facilities for drainage afforded by the declivities of the surface, are saturated with liquid filth, and abound with nuisances of every description. Simpson's Square, at the upper end of Deansgate, contains about twelve houses irregularly distributed; a portion of it is lower than the rest, almost cut off from air, except what finds its way over the tops of the houses. A covered way, in which is placed the door of one of the houses, leads into another yard, completely surrounded by buildings; in this are three dwellings, one of which has the door placed within two yards of the blank wall of another building, as if to prevent, if possible, the access of air; another stands over a privy. On the opposite side of the yard is a brick tube, or conduit, which conveys the night soil from the necessaries above; this is broken, exposing the contents, and presenting a most loathsome spectacle. The inhabitants are weavers of caddows, and to all appearance wretchedly poor; the dwellings dark, close, and dirty. Grime-street, though more open to public inspection, has one-half of the lower portion unpaved; the drainage of the upper portion saturates the soil, and all kinds of filth lie upon its surface. In one of the houses there were, during the last year, six cases of fever. From Grime-street, a series of passages run parallel to Deansgate, which are always in a most repulsive condition from the ashes and filth which is collected in them. Paddies Yard, a court containing five houses, is entered by one of these passages. When visited, the entrance was partially covered with ashes and refuse from an overflowing privy; the court contained twenty-seven inhabitants, two had died during the year, both children. One family, consisting of seven, were five years ago all attacked by fever; one child died of small pox. In another house, where there had been much sickness, a young woman lay sick of consumption; and in another, a child had been sick ever since they entered the yard three months ago. The necessary at the entrance is the only accommodation afforded to the houses in this court, besides several houses in the front street. Back King-street is about ten feet wide, almost always half covered with filthy drainage; never swept, the inhabitants say, and the dwellings dark and dismal. One of the houses at the upper end is rendered damp by the filth of a pigstye in the yard of the house at the front of the street. This family had all had fever previously to coming here; they may be expected to have it again. A bill in the window informs the public that a day and evening school for children is kept here. On the other side is a passage leading to a yard unpaved, and exceedingly filthy. From this passage a flight of steps descends to two cellars, one of which is about 14 feet by 16, and is to be used as a dormitory for German minstrels, the proprietor of the establishment purposing to erect four bedsteads in it; the other cellar is used as a stable for asses, the dung is allowed to collect, and judging from the softness of the floor, and the difference of height of the two cellars, it is several inches thick. At the bottom of the street is the yard of a dung collector, who stores up his purchases until he can dispose of the same to advantage. Opposite this yard are three or four houses; at the end of these houses is a privy, belonging to a mill, a stable with its accompanying dung heap, and the filthy water from the army hospital, situated at the other end, floats past the doors. In two of these houses there had been during the last year five cases of fever; in one the mother of the family had had fever four times, two of the children had had measles, and there were three cases of fever besides. King-street gave similar results; the cellars are some of the worst in the town, dark and wet. In one house a family of six had all had fever, one of whom died. In the next house a family of eight, two of whom, according to their own statement, had had fever; but from the statement of the neighbours I learned that all eight were attacked. In the next house a family of six, four had been sick of fever; the man ill for seven months from the attack. A house a little lower down is used as a furnished lodging-house; in an apartment at the back lived a family of six, they had only one bed, the apartment damp, the bed under the window was in bad condition: a sterner picture of gaunt misery I have never seen. The mother was scarcely convalescent from fever, and the children appeared half famished; four of them had been attacked with fever, and the children had had small pox and measles besides. Another house, on the opposite side of the street, is used in a similar manner, the apartments being re-let as furnished lodgings. The house is large, containing 15 apartments, five of them were empty; in the other ten, there were fifty people; each family, with the exception of one of the cellars, was furnished with one bed only. The numbers in each family were as follows:—1 of 2, 2 of 3, 1 of 4, 1 of 5, 3 of 6, 1 of 7, and 1 of 8. Some old buildings behind this house are used in a similar way, several families dwelling in them, each family being accommodated with a room about 12 feet square, and one bed. Two of the families consisted of five, and one of six individuals; all these people, more than seventy, have access to the same yard, and have only one necessary. It was, when seen, dilapidated and dirty, so as to be useless. The result of such a state of things was seen in the condition of the yard and passages, which were filthy beyond description. There is another house adjoining used for the same purpose; this, when visited, had only three families in it, the rest of the apartments being to let, They were, however, during the summer months of 1847 pretty throng, all, or nearly all of the apartments being let; they would then contain, in the whole of the establishment, about 150 individuals. Each family pays from 2s. to 3s. per week; one living in the cellar, having two beds, paid 4s. per week. This house is well known to the Relieving Officer; the people are of course destitute, and without home of their own, driven by poverty, induced by misfortune or dissipation to take refuge here, they are thus crowded together to the injury of their health, and when sickness attacks them, they become at once chargeable to the parish. At the bottom of King-street are situated Joiner's Square and Water Side. The houses on the south side of Joiner's Square serve the purpose of a retaining wall to the lower portion of Mr. Marsden's timber yard; the soil is saturated with the rain, and the walls of the houses absolutely wet, the timber of the stairs rotting away from the wall, the drainage of the houses passes along open channels from either end of the court to the centre, where it passes down the soughs, and under one of the houses at Water Side. The channel is simply paved with boulders, and the filthy water soaks through into the subsoil. The houses at Water Side in their turn serve the purpose of a retaining wall to Joiner's Square, the earth of which is saturated with the filthy drainage of the houses above, so that the wall of the bed-room is wet, the stairs being black and rotten from the water which flows on to them; the houses are, besides, liable to be flooded, from the rising of the river. At one end of the plot are four necessaries, the privy being under a dwelling; this dwelling had been used as a lodging-house, and was, during the summer, much crowded. Fever had been exceedingly rife, the whole family being sick, one of whom died; how many of the lodgers had fever, I could not learn, for the fever had broken up the establishment, the dwelling being cleared out and closed; but from the testimony of the people, the whole neighbourhood was infested, scarcely a house escaping. Out of ten families there had been ten deaths within the twelve months. The influence of these causes of sickness had operated with terrible success upon the children. Out of eleven children under five years old, belonging to these families, seven had died during the twelve months. In one of the houses lay the corpse of a young woman 24 years of age, who died of decline, brought on by wading through the house and street during a flood, in order to get to her work. This family had been reduced, within the twelve months, from twelve individuals to seven: the father was accidentally drowned, two up-grown children died of decline, and two smaller children of fever and measles. The prevalence of fever and sickness generally in King-street and the neighbourhood may be inferred from this, that out of 76 families, comprising 356 individuals, there had been 35 cases of fever, and 28 deaths from all causes, or the mortality had been 7,8 per cent. Though the year 1847 has been an extraordinary year for the prevalence of epidemics, and no estimate can be formed of the average annual mortality from the experience of one year, yet we can scarcely avoid attributing this enormous waste of life to those obvious causes of disease which have been specified. Had their dwellings been dry, and had the filth which accumulated around them, poisoning the atmosphere, been constantly removed, and a due supply of fresh air admitted to their dwellings, there can be little doubt but that the majority of those now dead would have been still living. Water Lane is an irregular lane, containing perhaps some of the oldest houses in the town, is badly drained, and contains several back yards, mostly unpaved, wet and dirty. Between Water Lane and Duke's alley is a narrow passage of the same character; there are privies at the bottom of it, close by Mr. Albinson's foundry, apparently utterly neglected, and exceedingly offensive. There are also several courts or irregular passages at the bottom of Water Lane in need of great improvements, both as regards construction and cleansing. There had been several cases of fever in this neighbourhood, and out of 229 individuals there had been ten deaths during twelve months, or very nearly five per cent. Velvet Walks is somewhat cleaner in appearance, but is only drained by a gutter, and is so crowded round by other buildings as to be almost cut off from any chance of obtaining fresh air. Taylor Brow is an irregular plot of ground, a considerable proportion of which is unbuilt upon; the greater part is unpaved, and the descent from Deansgate so uneven, that a stranger entering in the dark would run great risk of serious injury. There are no sewers, an open gutter, which becomes, towards the bottom of the Brow, of formidable dimensions, receives the slops of the houses. The gutter is unpaved, and becomes, in consequence, a rivulet of stagnant mud. A portion of the houses run alongside the river, a blank wall terminates the passages, and immediately in front of these houses the ground rises abruptly higher than the roofs, so that a current of air setting up the passage would have to return the same way, or be driven upwards. The inhabitants were not aware of any inconvenience from this; on the contrary, they seemed to think it snug and cosey. The waste land is chiefly occupied by middens and pigstyes, privies, and open sewers. The dwellings of the people contrasted very favourably with the character of the place in which they lived, though chiefly of the poorest class. In many instances the houses were scrupulously clean, and the character of the population seemed, with a few exceptions, much superior to what might have been expected from the appearance of the locality. There had been, however, several cases of fever, and influenza had prevailed extensively. There was one spot, however, different to the rest in the character of the population; it is a small court, situated at the top of the Brow, containing about seven houses, inhabited, with one exception, by Irish families. Here they had crowded together two or three families in a house, one house being used as a lodging-house for Irish harvest labourers. The whole of this court had been infested with fever: one family, consisting of seven, had all had fever twice over, and the only house that escaped infection was the one inhabitated by the English family, they attributing their immunity to the plentiful use of water. Gaffer Ginnel, or Rope and Anchor entry, is a long tortuous passage, leading to a court containing ten dwellings. There are two dwellings in the passage. These contain, in all, about 70 human beings; at the end of the covered passage is a large privy, in a most offensive condition. There is a dwelling over this privy entered by a winding staircase, and the dwelling-room, lighted by two small sky lights, is so dark they are unable to sew while seated at the fire at mid-day. The man has not been well since they entered, and in summer time they are tormented by thousands of flies; for this—dwelling, I suppose I must call it, a wealthy millowner and magistrate exacts 2s. 6d. per week from a person in his employ, who again relets it for 1s. 6d. At the other end of the court are a tallow-chandler's works and a tobacco manufactory, another covered way leading into Bridge-street. The rendering or melting of the tallow causes most offensive smells, and the closed character of the court makes a free circulation of air impossible. There were two cases of fever in this court, besides four cases in a family who had removed hither from a yard a little below. From 77 inhabitants there were five deaths, about six and a half per cent. In Wood's Court there are two most offensive nuisances: in one case the necessary was broken down and unfit for use, almost surrounded by a great heap of ashes and night soil; this heap is considerably higher than the kitchen window of one of the houses in Bridge-street, and is the only prospect, or view, which the said window affords. At the other end of a court, situated within Wood's court, is the other nuisance, a large privy crammed up in a corner, whose noxious exhalations, entering some of the back rooms of the Mechanic's Institution, create an abominable stench. The court is entirely surrounded by buildings, and depends upon an occasional downward gust for the little fresh air which enters. Back Crown-street is simply an entry about six feet wide, with four houses on the side; these houses are blank behind, and depend for ventilation upon the air which can find its way up the entry. A little further up there is a slaughter-house, with a large cesspool, containing two or three tons of slaughter-house refuse; it is situated behind one of the buildings and completely pent up, so that the noisome vapours of the cesspool are unable to float away before they have risen above the houses. In one of the houses there had been six cases of fever, one of whom, a mother, died and left three children. Within a yard of the back door of this house is a wall, which separates a pork butcher's premises, where pigs are kept and slaughtered. Though the weather was frosty, the odour of the styes was distinctly perceived, and in summer time it is almost intolerable; the woman of the house, though anxious lest she should say anything against the interests or supposed rights of her neighbours, distinctly expressed her conviction that the fever was due to the noxious emanations of the styes and cesspools. Further on there are two yards succeeding each other, and another place which cannot be called either a yard or anything else. Considerable ingenuity has been expended here in rendering every inch of ground available, and has certainly produced a curiosity in the constructive art. By descending a flight of steps you enter a yard or court, containing four or five houses; from this you descend another flight of steps, which leads to another yard of five houses, from which there is another flight. At the bottom of this third flight is the door of a dwelling, and by an underground passage you arrive at the door of another still. These dwellings consist of a single room each, and under the windows which open to the river is situated the gas manufactory of Mr. Cullen. In one of these rooms seven people exist; in the corner, at the bottom of the steps, is a brick tube, which serves to convey away the night soil of some necessaries above. This tube does not always perform its office well, and the contents occasionally bubble up. A washing liquor manufactory either is or was carried on down the same steps, and completes this nauseous detail. That people may become accustomed to live in such places, and apparently to be reconciled to their position, is strange; yet one of these families had lived here for 13 years, and, though complaining of ill health, seemed not to be aware of its cause. Out of 124 individuals seven had died, or five and a half per cent. Brook's yard, in Churchgate, is entered by a narrow passage, in which are four houses; three more houses are in the yard, the necessaries being just before the doors. Clarke's Entry varies from about six to twelve feet wide, with houses on both sides. In the first portion the houses are old and in bad repair, and at the entrance to the second portion is a dilapidated necessary and heaps of filth and refuse; the houses on one side receive all their light from the court, and none of them have any means whatever of ventilation, some of them smelling most offensively. There had been no instances of fever during the last 12 months, but the deaths had been excessive: 115 live down this entry, and there had been nine deaths, or eight per cent.

All the places hitherto mentioned are between Deansgate, Churchgate, and the river,—are not more than twenty or thirty yards from its banks, and twenty or thirty feet above its bed. They are most of them exceedingly filthy, and are badly drained. Passing to the other side of Churchgate, we come to perhaps the worst spot in the town, in proportion to its extent,—Molyneux's yard. At the entrance to the worst portion of this yard are a slaughter-house, yard and large cesspool; the yard is unpaved and undrained. There are two houses, one used for pigs and the other for human beings. In this house were three families, comprising ten individuals; one of the men was then ill, indeed the Union Surgeon of this district states that he is scarcely ever away. There are two rooms 12 feet by 10, and 7 feet high, so that the breathing space is about 170 cubic feet each. In immediate contiguity with this place is the Flaggs and Oliver Lane; here fever had infested the whole neighbourhood. In the houses behind the Royal Oak there were several cases; in one the husband had an attack six weeks in duration. In the next house a family of seven, four of whom had had fever, and one died. Immediately opposite these two houses is a necessary in a broken condition, the privy full, and heaps of ashes and night soil occupied a considerable portion of the yard. Beyond this heap of refuse is the cesspool of Molyneux's yard, only separated by a wall, which was part falling down. The next houses to these have the doors looking in the opposite direction, and are not quite so much exposed to these nuisances; they are, however, not removed from the malarious influences which arise therefrom; besides, the whole passage is a series of nuisances from beginning to end—the pavement broken and covered with puddle, the channels stagnant reservoirs, with middens approaching the doors of the houses; some of the floors of the houses are below the level of the street. The houses are old and ruinous, about six feet high to the ceiling, with latticed windows; they are dark and dingy, and some of them apparently inhabited by lewd and profligate characters. Here physical and moral pollution runs riot, both mind and body become distempered, and equally find employment to the police and the Union Surgeon. Only two houses afforded a clean appearance inside, and these were inhabited by people lately come. These, if they stay in the locality, may struggle for a time to maintain this superior appearance; but the struggle under such circumstances is hopeless, and in the end they will inevitably settle down to the same low level as their neighbours. The passage contains about 36 dwellings, in ten of these there had been fever, in all more than 20 cases. Out of 113 inhabitants there had been nine deaths from all causes, or eight per cent.

The Legs yard is more cleanly in its appearance, but it is closed; and in one corner a house has been broken in, and the lower part converted into a receptacle for the refuse of the inhabitants, and apparently contained several tons. The yard contained 53 inhabitants; to these had been three deaths, one from consumption, and there was another apparently far advanced in the same disease. Wigan lane is another closed court, the houses so decayed that they have to be supported by beams passing across the court from side to side; the slops of the houses are thrown into the gutter, which passes along the whole length of the court. At the farther end the lower part of a house has been converted into a privy or midden stead, which receives all kinds of filth; this was full to overflowing, the ashes and night soil stretching across the court to the door of the opposite house. The rooms over this privy are used as a dwelling; the inhabitants living therein stated, however, that "they had had no sickness, thank God." The next house had not been so fortunate: the whole family, consisting of ten, had been attacked with fever, some of them sick for four months. The dwellings were in harmony with the character of the court, the floors generally below the level of the passage, and the flags of the floor in one or two instances so broken up, as to give it the appearance of having been paved with paving stones. These were coated with the dirt of weeks, or months; the little light that could find its way through the casements was in some cases almost entirely shut back by some dingy representative of a curtain, the people apparently unconscious of the benefits of cleanliness, light, or air. In the immediate neighbourhood of this place is a large yard, containing slaughter-houses, stables, pig-styes, and dung heaps; 14 or 15 tons of stable manure and slaughter-house refuse are sometimes heaped up here; the yard is surrounded by buildings on all sides, so that the pestilent vapours of these nuisances are pent up in the most concentrated form, and enter with the least possible dilution the chambers of the neighbouring houses. The "Shambles nuisance" has acquired more than local notoriety for its unmitigated abominations, and the shameless pertinacity with which it is maintained in spite of public remonstrance, and the efforts of the magistrates. The erection of these buildings was an architectural blunder. Originally intended for a market, they have been found unfit for that or any thing else, and as a last resource the shops—that were to have been—have been converted into slaughter-houses. In the space of 30 yards by 20 there are 10 of them, and on "killing days" the passage becomes a pool of blood and liquid filth. The buildings are three stories high, the upper rooms supported by pillars project about eight feet over the rest; these rooms are occupied on one side by the compositors of one of the newspaper offices, and on the other by dandy weavers. If they should ever so far forget themselves as to open the windows, in the hope of obtaining fresh air, they would be speedily reminded of their error,—the stench which arises from the refuse frequently left to putrify upon the surface; or even if this be removed, the tepid effluvium which ascends from the reeking carcases of newly-slain beasts is a sufficient inducement to keep all close. Behind one of the ranges of buildings is a passage 30 yards long and two yards wide, which was almost impassable, ashes and human excreta scattered upon the surface throughout its entire extent. In its centre stood a necessary in ruins, whose condition I will not venture to describe. The adjoining privy was used as a cesspool for the slaughter-houses, and immediately over this are the bed-room windows of two dwellings. Various attempts have been made to get rid of this nuisance, but hitherto without effect. The whole is, I suppose, private property, nuisances included. What a pity that the poison which it generates cannot be made private property too; but as this is for public use, the public have a right to complain. Hitherto they have complained without redress; the inspector of nuisances has brought the matter before the magistrates more than once, but the guilty parties manage to escape, and the nuisance remains. Thus private interest wages a successful war with the public good, outrages with impunity every claim of public decency and public health, and maintains in the heart of the town a vile pestiferous laboratory of disease and death. It is with shame and indignation that we record such things, and fervently hope that the system of impotent misrule, under which they are allowed to exist, will be superseded by a local government possessing powers sufficient to the protection of the public health, and stimulated to the effectual discharge of their duties by a central supervision.

There are many other parts immediately behind

Deansgate, on the same side, that are similar to those already described. In Shipgates, or rather at the top of Crown Entry, there is a cesspool of enormous dimensions, over which are placed two dwellings. The space between Deansgate and Hotel-street is chiefly occupied by stables, pig-styes, and dung-heaps. The space bounded by Deansgate, Bradshawgate, Fold-street, and Mealhouse-lane, with the space between Deansgate, Hotel-street, Mealhouse-lane, and Market-street, will comprise not less than 10,000 square yards: this land is in the centre of the town, and would let for 2s. 6d. per square yard. With the exception of the shops in Deansgate and Bradshawgate, it is occupied with property of little comparative value, and is crowded with nuisances. The removal of this property, and the construction of two or three blocks of well-built shops, is well worth the consideration of parties seeking a good investment for surplus capital. Spring Gardens and Howel Croft, and the yards included between them, with the yards between Howel Croft and Old Hall-street, are in a low sanatory condition: the yards are, many of them, crowded with inhabitants, whose dwellings are mingled with stables, slaughter-houses, pig-styes, and dung-heaps. These yards are entered by covered passages, and are closed at each end; in most, the drainage is by open gutters. Towards the bottom of Back Spring Gardens is a large sewer partially uncovered: it is here that the density of the population attains its greatest limit. According to the registration districts there are here 399 houses in 18,000 square yards: the houses in the portion of district examined gave 5,47 inhabitants per house, which gives nearly nine square yards to each individual. At the bottom of Spring Gardens are four slaughter-houses, with three large cesspools: the yard next adjoining has a large dung-heap at its entrance. In the next yard there had been two deaths, one from measles, one from convulsions; a large drain had been recently covered, and a privy in Howel Croft sometimes flows over into this yard. In the next yard, similar in character, was a dame's school. In some of the yards the rooms were made into dwellings for separate families, one of the rooms being over a stable. In one of the yards, chiefly occupied by weavers, the dwellings were only ten feet by nine, having one room to live in, and one to sleep in. In another yard, a house about fourteen feet square, two families, amounting to twelve individuals, occupying only one room on the ground floor; they had only two beds, one for seven of them, the other for the other five—no bedsteads, the beds laid upon the damp floor: these people followed the trade of besom making, and the house was exceedingly filthy. The next house was surrounded by nine necessaries, having privies on all its four sides; one of these is just before the door, another, upon one of the sides, had been suffered to accumulate four or five feet above the level of the path, and to lie piled up against the wall, the liquid contents draining into the house: this house had become infested with fever, the parties becoming chargeable to the parish. Thus landlords neglect their duty, people become sick, they are attended by the Union surgeon, and relieved by the relieving-officer, and the rate-payers pay. The yards on the side of Howel Croft have not many inhabitants, but they are no better in other respects. There are several yards or courts, between Howel Croft and Old Hall-street, containing a considerable number of inhabitants: these are entered by covered passages, and, like the rest, contain all the filth of the neighbourhood. Many of the houses are newly built, and appear pretty clean themselves, and the yards and passages tolerably decent and clean, the filth being kept in its own proper receptacles; but it matters little to the health of the inhabitants in what particular spot of the yard it be, it does not become innoxious, and though appearing less repulsive to the eye, has not ceased to generate poisonous gases. These yards are completely closed on every side, so that, unless the laws of pneumatics be set aside on their special account, the inhabitants can have no fresh air; and yet, it would appear, they are not badly off in this respect, for one of them gravely informed me, that "I would not believe how the wind rushed down over the tops of the houses." It is refreshing to think that such a phenomenon does sometimes occur. Back Spring Gardens, on the west side, is in the same condition. There is a nuisance at the end of Barn-street, which may be taken as a sample of several more, that are less exposed to the public eye. In Spring Gardens, between Ashburner-street and Great Moor-street, is another large yard in a filthy condition, and, on the opposite side of the street, a shippon and dung-pit planted in the midst of the houses. There were several instances of fever in Spring Gardens; in one lodging-house there had been six cases and five deaths. Out of 592 inhabitants, in this district, there had been 26 deaths from all causes, nearly 4½ per cent. Cross-street, Back Cross-street, and the immediate neighbourhood, is the abode of the Irish population; the streets are tolerably wide, and the houses, as originally built, are less objectionable than in many other parts. The disposition to crowd together, so characteristic of the Irish, is seen in the fact, that 61 houses contained 480 people, or, on the average, 7.87 per house. Similar houses, inhabited by an English population, Andrew-street for instance, give 5.82 per house. The streets and yards are exceedingly dirty, the necessaries too limited in number, a whole row of the houses being entirely without. The waste ground at the gable ends of the houses, and even the foot-paths across the railway bridges, in the principal street, were in a condition that defies description; the interior of the dwellings close, ill-ventilated, and dirty; a warm, sickly effluvia meets you upon entering, and sufficiently accounts for the disease and mortality amongst the inhabitants. The cellars are, of course, still worse; the average number in each was very nearly the same as for the houses, viz., 7.77 per cellar. During the late fever epidemic this district had been infested to an extent that few of our good townspeople imagine.

I have already given the testimony of the Union Surgeon, which shews that one-eighth of the population was sick at one time; his visits extended through the whole neighbourhood, going from house to house, sometimes beginning with the cellar and ending with the garret, having patients upon every floor. Though many families had been removed, and some of them almost entirely cut off by sickness, so as scarcely to leave a single survivor to tell the tale of wretchedness, still most fearful evidence remained of the extensive and fatal ravages of the "Irish fever." Though much of the affliction was, doubtless, due to the importation of Irish, still it is pretty evident that if the crowding could have been prevented, the epidemic would have been much diminished, if not entirely suppressed. Arriving in this country in a state of the most abject destitution, without the means of providing themselves with proper accommodation, they were of course received with that cordial fraternity so characteristic of the Irish people. The process of condensation was carried to an incredible extent, the low lodging-houses of the Irish being crowded beyond measure. In one of these it appears, from unimpeachable testimony, the fever took its rise, and was evidently due principally, if not entirely, to the numbers who were crowded together. This lodging-house, or cellar, situated in Dawes-street, is a single cellar 14 feet by 15, and 8 feet high; in this space 25 human beings had lived and slept together at one time, the floor being covered with straw. Allowing each a space five feet long by one and a half wide, three more people would have covered the entire floor. The cubical contents of the cellar gave 67 cubic feet of air to each individual. Now when it is known that each person would vitiate in the course of the night about 300 cubic feet of air, so as to render it unfit for the purposes of respiration, can we wonder that when restricted to 67 cubic feet they should be subject to fever and other epidemics; and that when fever does break out, its ravages should be so fearful? In this case fever had been raging for 18 months, until at length the authorities interfered, and the parties removed out of the cellar. Some idea may be formed of the extent of its ravages from the fact, that whole families had fever twice, and in some instances three times over; out of one house 11 had died, out of the next house 7, and out of another, which then contained 21 persons, I was informed that they had buried "a lot." The cellars are about 15 feet by 14, and 7 feet 6 inches high; I found several instances of 10 or 12 persons in one cellar, and in one case 16. These constituted three families: one family consisted of five, and another of eight; they had only one bed for each family. In the case of the family of eight the bed lay upon the floor. Every one of these 16 had had fever during the 12 months; the two larger families, consisting of 13, had all had fever twice. Indeed so common was it for the wretched creatures to have fever twice, that they scarcely considered themselves safe until after a second attack. Nor are the causes of fever removed. It is evident that there is the disposition as strong as before to live two or three families together. They do not appear to be aware that the causes of fever are chiefly due to their own habits; for when asked how it was that the Irish were so subject to fever, they said they could not tell, it was God's will. So long as this mistaken notion prevails, little will be done by them to remove the causes of disease; they bear patiently what they seem to regard as the decrees of Providence, and continue to live surounded by filth and indifferent to the ordinary means of preserving health and life. The condition of the Irish poor in this district has been made still worse by depriving them of water. The supply which was formerly laid on in the houses has, in a great many cases, been cut off; the inhabitants depending for a supply upon one of the water stands in the street. This stand was broken, so as to be useless, and the people have now to fetch water from a considerable distance. Some of them complained of this, and stated their willingness to pay for the water, if the landlord would lay it on. Andrew-street and Back Andrew-street are exceedingly objectionable, both in the construction of dwellings and in the means of cleanliness and decency afforded to the inhabitants. They are chiefly back to back houses, and the streets, which intersect the block, are much too narrow; in the centre are placed the necessaries for the use of the whole of the inhabitants, and constitute a nuisance most disgusting in appearance. It is not necessary to pursue this detail further, otherwise it might be extended *usque ad nauseam*. Many other districts, besides those described, are in a similar condition. The yards in Old Acres and Bradshawgate, some of the narrow streets in Little Bolton, such as Back Chapel-street, which, from privies in a bad condition, is in a most repulsive state; Bengal Square, and the space behind some of the streets branching out of Moor lane; Back Flash-street, which is in fact a closed court; Ridgway row, Rothwell-street and neighbourhood, all afford ample material for a more extended description.

Some remarks are, however, needed respecting the defective accommodation provided for the inhabitants with respect to necessaries, and depôts for ashes and refuse. Some instances have been already given of neglect in this particular; but the disregard which has been shewn by builders and owners of cottage property to the comfort and health of the tenants, and to the preservation of their morals, is most infamous. The practice of placing them under dwellings, with bedrooms over the privies, which, we should imagine, would not be tolerated on the ground of its indecency, to say nothing of its unhealthiness, has been extensively followed. From 30 to 40 examples might be readily found in the borough; most of these are the property of wealthy millowners: several of them are of recent construction. Many houses are also left entirely destitute of any convenience of this description. In Crook-street are 18 houses utterly without; the tenants are, of course, left to trespass upon other people's property. A portion of Crook-street, Ormrod-street, and the houses behind, in all more than 40 families, have only four necessaries, placed two and two together. In the property already alluded to in Andrew-street there are 16 necessaries placed together in the centre of the buildings, for the use of about 900 people. These are divided into sub-clusters of four each, four being entered by one common passage; most of them are without doors. Stable Row, and the property in the adjoining streets, are in the same condition. Behind George Inn there are five placed in a row, most of them without doors, and the passage past them is used as a thoroughfare, from one street to the other. There are four more in Stable Row, also all placed together. In this street is the privy of the former five, which is of formidable dimensions, and when emptying is the labour of days; behind the houses is a vast accumulation of the refuse of a gas manufactory, ashes and night-soil. One of the houses was infested with fever a week or two ago, the parties requiring the attendance of the Union Surgeon and the Relieving Officer. In Foundry Square, Black Horse-street, there is an entry which can scarcely fail to attract attention, from its dirty and repulsive character; and yet the only necessary for the use of at least 20 families is at the bottom of that disgusting passage. It is easy to see that circumstances like these must be awfully demoralising. We may declaim as long and as loud as we please against the coarseness and indelicacy of the labouring classes, but while these things remain, it is hopeless to expect they should be otherwise. A delicate perception of the proprieties and decencies of life, refinement of manners, and high moral feeling, cannot exist long under such conditions, even if they be already formed, much less develope themselves *ab initio.* Every parent of average moral perception may easily pass a judgment upon these things for himself, by simply asking whether his own daughters were likely to be improved by being placed in such circumstances. That these evil arrangements have been productive of much moral mischief there can be no doubt; and though in some instances these circumstances, and others of a similar kind, may apparently have done their work in completely obliterating all feelings of self respect, so that maters of indecency have become matters of jest, yet by the great bulk of the inhabitants, the evil is perceived and deplored; many submitting to these shameless abuses with a feeling of indignant condemnation. These evils we should suppose have arisen rather from the want of reflection on the part of owners of property, than from a wanton disregard of the morals of the people. Surely there are none so devoid of consideration for the moralities of the poor as to wish to maintain the present system, while fully conscious of its pernicious effects.

From statistics published by Mr. Harris, the superintendent of police, it appears that there are 1468 cellars in the Borough, 1418 of which are returned as inhabited. They will average five individuals per cellar, at least, so that 7090 of the population live in cellars. Many of the cellars are damp, some of them absolutely wet. In Great Bolton very few have drains; the water used for domestic purposes must be carried up the steps and thrown into the channel. Even the rain water has to be collected, and in like manner carried away. Many of the inhabitants take up a flag and make a cavity, or cesspool underneath, for the purpose of collecting the water which runs down the steps; the flag being used to cover it. In some cases the door of the cellar closes two or three steps from the bottom, and then this cesspool is inside the cellar itself.

From the same statistics it appears that there are 84 mendicant lodging-houses; these have, in many instances, been the foci of fever; two instances have been already given. In another case in Howel Croft, during the last summer, there were 11 sick of fever in one room at one time, the poor wretches lying upon the floor all round the room. These places are both injurious to the health and morals of the town. In most of them the lodgers would not have more than 150 or 200 cubic feet each, even if we take the statements of the lodging-house keepers themselves, respecting the numbers allowed to sleep in one bed. In many there are four or five beds in one room, with scarcely room to pass between them. In one instance there were nine beds in the same room, and sufficient evidence was also obtained that both sexes sleep in the same room. These houses have undergone some improvement through the interference of the authorities, and the disclosures which have been made to the public; but there is sufficient reason still why they should be subjected to the strictest supervision.

The interment of the dead within the precincts of large towns is detrimental to public health, and in this town the evil is not diminished in the least by any rural burial-ground. A few are taken to Dean Church, about a mile from the town; but there are, perhaps, as many brought from the country to be interred here, so that about 1800 dead bodies per annum are buried within the Borough. The grave-yards are all of them kept in order, and clean, but it is somewhat singular that, with scarcely a single exception, they should be higher than the street. In one case there is a house built close to the grave-yard, the coffins lying against the wall of the cellar. There are three wells situated within a few yards of this burial-ground, one of which was lately used, though receiving a portion of its waters from the rain which filtered through the graves. In another it has been the practice to inter the poor in a large pit, or common grave; this is only temporalily covered with boards, until full of bodies, when a few inches of soil are thrown over them. A row of houses runs alongside this grave-yard; the inhabitants of these houses, while standing at their windows or doors, can see and count the coffins as they lie. There are two cellars, through which passes a sough, from which bones have been taken, and which convey away the filterings of the grave-yards. The fœtid gases arising from this sough would extinguish the flame of a candle. To expose this sough, it was only necessary to lift one of the flags of the floor, and the stench which arose from it was intolerable. The parties giving this information attributed the death of one of their children to this cause. To remedy the evil of interment in towns, several plans have been proposed; some have suggested the use of old coal mines for this purpose, and others would have the bodies conveyed by railway to the coast, and buried in the great deep. Some of the ancients burned their dead, a plan which appears to me superior to either of the other two. The ashes might be collected and buried, and the place of their interment thus become the spot, around which all the endearing associations and hallowed memories of the dead might gather. But the usages and customs of nations are not so easily changed as to afford any probability that any of these suggestions would be adopted; and any legislative enactment that would interfere with the feelings of the people in this matter, would not be desirable. Interment within towns might be prohibited, for the feelings of the people would be in favour of rural burial-grounds; and, with the exception of a few who might wish to repose in the same grave with a beloved object already dead, no reluctance would be felt to the change. Another evil connected with this subject is, the retention of the body in the house for several days previous to the interment. A great number of families have only one sleeping room, so that when a death occurs they must sleep in the room in which the corpse is laid. In cellars it is still worse, for the corpse is with them day and night. This matter need no special investigation to ascertain its truth: it is an every day occurrence. To remedy this, dead-houses are proposed to be established in various parts of large towns; and if they were so conducted as to assure the people that the bodies would not be interfered with, and no *post mortem* examination allowed without their consent, they would be gratefully accepted, and would soon come into general use.

I am not aware that any successful attempts have been made to abolish the smoke nuisance in this Borough. In your own works, by applying Bodmin's patent, the consumption of the smoke is effected; but unfortunately the benefit of your example is lost, through having other boilers upon the old plan connected with the same chimney. That smoke may be consumed, and the nuisance almost, if not entirely abolished, you, Sir, are at least fully convinced; and that the adoption of the plan produces a saving of fuel of 20 or 25 per cent.* Some estimate may be formed from this of the amount of unconsumed carbon which finds its way into the atmosphere. Coal contains about 80 per cent. of carbon; and as only a small part of the hydrogen will escape as sulpherated hydrogen, almost the whole loss is due to unconsumed carbon; or not less than 15 per cent. of the weight of coal thrown under the boiler passes away in smoke. The total amount of horse-power of the steam-engines in the Borough is 3597. Allowing ten lbs. of coal per horse-power per hour, these would consume 35,970 lbs. of coal; 15 per cent. of this, or 5495 lbs. of soot, are cast into the atmosphere every hour, during which these furnaces are employed: this is exclusive of forges, —the forge in Moor Lane, for example, Smiths' and other furnaces, Gas Works, &c. The town may well be dingy. All parties are interested in the abatement of this nuisance—mill-owners, that they may save their coal; owners of cottage property, that they may save painting and cleansing; and the working classes, that they may save soap and labour.

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* The effectual and economical consumption of smoke is well exemplified at Worsley Mills, and at the Royal Dock Yard, Chatham, where the City of Manchester Patent Smoke-consuming Company's apparatus is at work most satisfactorily.

The preservation of life, and the diminution of sickness and consequent poverty and suffering are, I apprehend, sufficient reasons to awaken the sympathies of the upper and middle classes, and to prompt them to active and vigorous measures for the removal of those causes of disease which press so heavily upon the suffering poor. But apart from reasons of this kind, there is still sufficient inducement to bestir ourselves to be found in pecuniary considerations. The enormous losses which the community sustains from various sources, all of which are connected with public health, appear utterly incredible from their magnitude. A little patient attention will, however, shew that, enormous as these sums appear, they are arrived at from simple calculations, from data which will scarcely be disputed. The most unreflecting will immediately see the close connection there is between sickness and pauperism; and that, if a man in the prime of manhood be cut off by death, the community suffers a loss. The effect of an increased mortality is a multiplied production of widowhood and orphanage; the stay and support of a family is cut off, and the children left to be supported by the friends and relatives of the deceased, or at the public charge.

There are no means of ascertaining exactly the amount of pauperism produced by sickness and death; but some idea may be formed of the cost incurred by the visit of some epidemic disease, by comparison of the numbers requiring medical attendance in 1846 and 1847, with the enormous increase in the in-door and out-door relief. In the quarter ending September, 1846, the number of cases of medical relief was 347; in the quarter ending September, 1847, 618; besides those that had been admitted into the fever shade, which was then receiving patients. The amount of in-door and out-door relief, in the quarter ending September, 1846, was £1,040 1s. 6d.; in the quarter ending September, 1847, £3,265 10s. 3d. The number of orphans, widows and children depending on them, had increased from 166, in September, 1846, to 240 in September, 1847. This was for the borough alone. A portion of the increased expenditure is due to the depression of the times; but the increase in the number of medical cases shews that a very large proportion of the total expenditure would be upon families depressed by sickness. This is the effect of one year's experience of severe fever. No provision for the approach of cholera has been made. We prefer, apparently, to pay the cost of an occasional devastation from cholera or fever, than incur any expense in mitigating their ravages. It is not improbable that cholera may visit us during the next summer, and, after nestling for a time in our dirty streets and yards, leave us a number of widows and orphan children to maintain. The cost of sickness, which appears in the augmented relief given to the poor, is only a small proportion of the total loss which the community suffers. Every individual of mature age, and able-bodied, is capable of making a greater return to the community in the value of his labour, than the cost of his maintenance, and is therefore a source of income, and his value as a productive machine may be determined. Mr. M'Culloch estimates a full-grown workman at £300. With every death of a full-grown workman there is, therefore, a loss to the community of £300. Now, if out of the 735 deaths per annum, which are due to removable causes, we only suppose 200 to be adults, we have £60,000 per annum as the total loss to the borough. This sum, however, is not one-half of the loss from this cause, as will be seen from the following considerations. If we refer to the Life Tables, we see that the loss of life, between the ages of 20-25, in Bolton, as compared with Surrey, is four years. Now, in the census of 1841, there were 9,574 individuals alive, between those ages, in the Bolton Union. These would therefore suffer an aggregate loss of life amounting to 38,296 years. Assuming that each adult, between those ages, can earn 5s. per week besides the cost of his maintenance, there would be an aggregate loss of £497,848 in the five years, or £99,569 per annum. If this loss could be prevented, there would be no necessity for poor rates. This is the money which ought to be earned by the husbands and fathers who die. This is the money which should be expended in the maintenance of their wives and families, and the education of their children, who now become, in many cases, the subjects of pauperism, or, in too many instances, the subjects of crime. This loss is due solely to the premature deaths of adults above the age of 20, and does not take into the account the loss which results from the destruction of life occurring under 20 years of age. This is, however, no insignificant sum, and may be estimated in the following way:—I assume between the ages of 15 and 20 the labour of an individual will be an equivalent to his maintenance; he will neither be a gain nor a loss to the community. That all under 15 cost for their maintenance 5s. per week, or in other words the capital sunk in the fabrication of a human machine is £13 per annum for 15 years, which sum must be refunded, or there is a dead loss to the community arising from this source, and which somebody must bear. Again referring to the life table, we ascertain that the total number of years lived by a generation of 100,000, is 3,489,582. The number of years lived by this generation after 15 of age has been attained is 2,465,789, which taken from 3,489,582 leaves 1,023,793, the number of years lived between 0 and 15. The number living at 15 years of age out of a generation of 100,000 is 59,894. These would, of course, have lived 15 years each, or in the whole 898,410 years. This taken from 1,023,793 leaves 125,383 years, lived by those who die before the age of 15. Each of these years has cost the public £13, the whole of which amounts to £4,629,979. This loss takes place during the progress of a generation of 100,000; and as in 1841 3887 children were born, 100,000 would be born in

26 years. So that dividing the whole loss by 26, there is from this cause a loss of £62,691 per annum. This loss, added to the value of the loss of adult life, gives £162,260 per annum. This is not imaginary, but real. All that has been expended in the support of children must be returned, either by themselves or by others, or the whole world would become bankrupt. If any one should have any difficulty in perceiving the force of this reasoning, he has only to suppose that a son 10 years of age, upon whom he has expended considerable sums for his maintenance and education, is cut off by death, and then ask himself whether he has not sustained a loss—I do not mean the loss of an object of affectionate regard, a loss which arithmetic cannot calculate—but a loss of hard cash, and the argument will, I have no doubt, become palpable enough. Now all this would be saved, if we could only so far improve the sanatory condition of the Borough, as to place the Bolton Union on the same level as the extra Metropolitan districts of Surrey. Whatever may be the value of the losses of life incurred by the population of Surrey, our loss exceeds it by £162,260 per annum. Again, if the mortality may be diminished, the sickness may be diminished in an equal ratio. We have seen that there are 14,700 cases of sickness per annum due to removeable causes. The duration of each case will be about 14 days, and cannot cost less than ten shillings, including loss of work, medical attendance, &c. This will entail a loss upon the Borough alone of £7,350 per annum. The deaths that might be prevented are 735 per annum: the funerals of these, at £5 each, amount to £3,675. Again, the low sanatory condition of a district is always attended with an excess of births. This excess for the Borough, assuming the normal rate to be one in 30, is 707. These, at £1 for each case, entails a further unnecessary expense of £707 per annum. These three items together cause an annual expense to the Borough of £11,732.

From this you will perceive that the present condition of the town is maintained, not only at an enormous sacrifice of life, but is exceedingly expensive; that Sanatory Reform is not only desirable, in order to diminish the sufferings of the poor through sickness and death, but even as a matter of economy. The sums annually lost far exceed all the poor-rates of the Union, and all the efforts of private benevolence twice told. The additional expense incurred through unnecessary deaths, and cases of unnecessary sickness, would alone suffice to pay all the water rents of the Borough, and leave a surplus sufficient to pay interest of 4 per cent. upon a sum that would efficiently sewer, pave, and cleanse the whole town.

The due supply of water is one of the most important elements in the sanatory condition of large towns; for the accumulation of refuse, where large masses of inhabitants are congregated together, very soon renders the springs in the immediate neighbourhood unfit for use, even if the supply from this source was not deficient: hence the necessity for the construction of efficient water works, by which a due supply may be obtained from purer sources. An act was obtained by a private Company in 1824, for supplying this town with water, obtained from the neighbourhood of Belmont. The water is soft and exceedingly well adapted to all domestic purposes. These works are now under the management of the Corporation, and the water sold at rates varying according to the rental of the houses, into which it is introduced. The water is constantly under pressure, and unlimited in supply; the inhabitants can draw when and what quantity they choose. The number of houses supplied at present is 7,567; the number of houses and cellars inhabited is 9,408, so that 1,841 families trust to the supply obtained from the stands erected by the trustees, and receiving their water from Bolton Moor, or beg or steal it. These are the only two sources of water fit to be used: the springs are contaminated with the drainage of the town, or are used to supply the steam-engines. The expense of the Bolton Moor Water Works, amounting to £7241 13s. 6d. was defrayed by grants from the Manufacturers' Relief Committee, by private subscriptions, and by the Great Bolton trustees; and the grants were made on the condition that "the town should be supplied with water gratuitously for ever." The water supplied from this source is much inferior to the water from Belmont. It is not laid on in the houses, but must be fetched from stands in the streets. The object had in view by the projectors of these works was benevolent, but it is more than doubtful whether any benefit has been conferred even upon the lower classes by their establishment. The lowest rates charged by the Corporation for water from Belmont is 4s. 6d. per annum, or 1d. per week, so that the apparent pecuniary advantage is very small; but the water is much harder, and for domestic purposes much more expensive. From inquiry I find that the use of this water would require four ounces more soap to each family per week. This would be 1½d., so that in the case of those who inhabit the poorest dwellings, there is a positive loss in using this gratuitous water, besides the trouble of fetching it.

It is ungracious thus to comment upon an undertaking, whose object was benevolent, but I think many people have begun to suspect that it has been a benevolent mistake; and truth compels me to add that, as far as I have had opportunities of observing, I have found that the operation of these works is adverse to sanatory improvement.

We have seen that in the case of Cross-street the water formerly laid on in the houses and cellars had been taken off, and the inhabitants subjected to the inconvenience of fetching water from the street: then the stand became useless, the authorities neglect to repair it, and the people must henceforth fetch their water from a greater distance. It is easy to see that such an arrangement must have an unfavourable influence upon the habits of the people with respect to cleanliness. Where water is thus obtained with difficulty, it becomes an object of value and is used with care, a smaller quantity being made to serve for domestic purposes and personal cleanliness, that the labour of fetching it may be diminished. There are so many advantages, moral as well as pecuniary, attending a constant supply laid on in the house at a cheap rate, that no gratuitous supply from the streets can be accepted as an equivalent. It is a pity that the money should have been thus expended, for it does not appear likely to confer any benefit whatever upon the town. In a sanatory point of view it is not desirable that the fountains, or water stands, should be much used, or even used at all; but that the people should prefer having water in their own dwellings. The only source, then, upon which we can rely for a proper supply of good water, is the Corporation Water Works; and it would be very desirable that power should be given to compel the introduction of this water into every house. There are 1841 families without proper supply. Much is stolen from the works by parties who pretend to obtain it from the fountains. Others depend upon springs, whose water ought not by any means to be used. The families in Molyneux's yard, for instance, fetched their water from the spring in Churchgate, immediately behind, and several yards below, the surface of the burial-ground. This water they stated when boiled became "quite fat," shewing incontestably that a portion at least of the water was due to the unctuous oozings of the grave-yard. The use of water like this ought to be forbidden, and if landlords will not voluntarily lay on the water for the tenants, they ought to be compelled. The amount of water which ought to be furnished to every family is estimated by Mr. Hawkesley, an undoubted authority, at 20 gallons for each individual. This estimate may appear high, but it is founded upon many years experience; and it will be seen, from the quantity actually drawn from the Bolton Works, that less than 20 gallons cannot safely be taken as the amount required. The water is supplied from two service reservoirs, besides the reservoir for storeage at Belmont. The whole of the reservoirs when full will contain 150 millions of gallons. The works as they now are will supply about one million gallons per day; 850,000 gallons have been delivered from the reservoirs per day, on an average for four months, ending Feb. 1848. There are 7567 families supplied, which, allowing five persons to each family, and 20 gallons to each person, would give 756,700 gallons, leaving about 100,000 gallons a day for other purposes and waste. It is, therefore, apparent that less than 20 gallons daily would not suffice, if the people come to use water a little more freely. In a few years the population of the Borough will probably amount to 60,000, and the water required would be 1,200,000 gallons daily, exclusive of the quantity wanted for manufacturing purposes, so that the works will not, without extension, be able to furnish the required supply.

This subject has, for some time, occupied the attention of the Council; and the question, whether the present reservoirs and mains, with increased storeage, would be sufficient, is not without interest. The water is derived from the rain which falls upon the moors, and the amount obtained simply depends upon the extent of surface drained. From a register, kept by Mr. H. H. Watson, of this town, of the fall of rain for 15 years ending 1845, the smallest quantity which fell in any one year was 34.63 inches. Supposing that, from the months of April to September inclusive, one-half was lost by evaporation, and in the remaining months one-quarter, we have still 21 inches. This would give, upon a square mile, 298,951,317 gallons per annum; or a square, two miles upon the side, would give more than three million gallons per day. That an almost unlimited supply can be obtained from these moors, is sufficiently evidenced by the fact, that it is proposed to supply Liverpool from the same neighbourhood; so that all that is required is sufficient storeage room, which can easily be provided. The only question that remains is, whether the present mains will allow a sufficient quantity of water to pass. The principal main is eighteen inches in diameter, and 3,500 yards in length. The principal reservoir is 197 feet above Deansgate, the mean altitude of the town. In Philadelphia, the loss of headway due to the friction of the service pipes, when the city is drawing, is 25 feet. Deducting 25 feet from 197, Robinson's Formula gives 27,279 cubic inches per second, or 5,804 gallons per minute. Mr. Hawksley's Formula gives 5,209 gallons per minute. Taking the latter quantity, as the nearest approximation to the truth, this main alone would deliver 312,548 gallons per hour, or a sufficient quantity, in four hours, for all the domestic wants of the town. A most abundant supply, therefore, could be obtained from this source. The other reservoir is 95 feet above Deansgate. From this proceeds a main, 14 inches in diameter, and 2,790 yards in length: this would deliver 128,919 gallons per hour.

There is also a great necessity for the introduction of a larger supply of water for the purposes of the steam-engines. Several of the reservoirs are in a very filthy state, and, in some instances, parties have availed themselves of the sewer water. There is a reservoir, at Mr. S. Taylor's mill, near Bulfield, in an exceedingly filthy condition: a large open sewer conveys the water into a reservoir, where the sediment may subside previous to the water being used. There were, during the last summer, several cases of English cholera and fever in this neighbourhood. This is more remarkable, as the houses are at the outskirts of the town, immediately adjoining the open fields, and shews the connexion of open drains and reservoirs of black stagnant mud with cholera and fever. There is another reservoir at the bottom of Crown-street, belonging to the mill of Mr. Cullen, and another in Black-horse-street, belonging to the Union foundry, which, if we may judge from the stench which sometimes issues from them, must be exceedingly filthy. I do not know how far these parties may be to blame for not endeavouring to keep these places cleaner, but some allowance certainly must be made for the difficulty of obtaining the required supply of water. Many have expressed their readiness to purchase even to the amount of 10, 20, and in one case 40 thousand gallons of water per day, if the water works were extended, so as to furnish these quantities. That they may be made to furnish two million gallons per day, besides supplying the domestic wants of the inhabitants, there can be no doubt, which is a larger quantity than is ever likely to be wanted for manufacturing purposes. There is no necessity for the continuance of these nuisances, and it is to be hoped that, when the water works shall have been sufficiently extended, no sewer water will be used.

Though the water works have been established for 25 years, there has been no attempt by the authorities to supersede the old fire engines, and to render the pressure in the mains available for extinguishing fires. During the last two years more than £1300 worth of property was destroyed, and the present year will more than equal the other two. This may be owing to the trustees not being able to arrange with the Water Works Company; and even now the management of the water works is the business of the Corporation, and the management of the fire engine department is the business of the trustees. But as these several departments will in all probability be consolidated, we may expect that the immense force, now lying dormant in the mains, will be brought into active operation for the extinguishing of fires. The pressure in the mains supplied from the upper reservoir, that is to say Great Bolton and a portion of Little Bolton, is equal in the day time to at least 170 feet. The result of certain experiments made to ascertain the height that a jet of water will rise from the mains and services of the Southwark Water Company, under a fixed pressure of

120 feet, was laid before the Health of Towns Commission. From this it appears that from a 4-inch main, with 40 feet hose, and ⅞-inch jet, the water rose 40 feet high. When removed 200 yards from the 5-inch main, to which the 4-inch was annexed, it still rose 34 feet. From a 7-inch main, with 2½-inch stand pipe, 40 feet hose, and ⅞-inch jet, the water rose 50 feet; and from a 9-inch main, under the same circumstances, it rose 60 feet. The quantity of water delivered from the 4-inch main was, in the first instance, 112 gallons in 82 seconds; in the second instance, 112 gallons in 90 seconds; from the 7-inch main 96 gallons, in 59 seconds; and from the 9-inch main 114 gallons in 64 seconds. When three jets were playing at one time from the 7-inch main, the height to which the water rose was only diminshed 10 feet. A portion of the pipe laid in the borough is only 2 inches in diameter; it amounts to 2,399 yards in length. There are 17,186 yards of 3-inch, 11,024 yards of 4-inch, and the rest, 5,715 yards in length, from 5-inch to 12-inch in diameter; but as the smaller mains will generally be in the minor streets, where the necessity for a powerful jet is less urgent, the evil is, practically, of less importance. The difference in the height to which the water rose from a 7-inch main and a four-inch main was 10 feet; the difference between a 4-inch and a 3-inch main cannot be much. A mill or warehouse, standing on the level of Deansgate, and 5 stories high—each 12 feet, or 60 feet in the whole—might have a stream of water from a 7-inch main, and a ⅞-inch nozzle, thrown right over the roof, as much as could be accomplished by an engine with two 7-inch barrels, and 26 men to work it. A warehouse or mill might be effectually defended by introducing an upright main, with a plug in each room. The expense, according to the testimony of Mr. Anderson, of Preston, is only about £25 or £30 for a warehouse five stories high. The Company charge one guinea, annually, for the privilege; so that the

total annual cost is only two guineas. He further states, that such was the confidence of the mill-owners in the safety which this method afforded, that some of them contemplated giving up their insurances. This method might be very readily adopted in this town, though the mains are smaller in diameter than the mains of the Southwark Water Works, yet there is a greater pressure on the level of Deansgate. The difference, in favour of this town, amounts to 70 feet.

Public Baths have been erected in this town, and during the last year were opened for public use. The buildings cost about £5000, and contain accommodation for hot and cold, shower, or plunge baths, for all classes and both sexes. From returns kindly furnished by Mr. Brown, it appears that during five months, ending Oct. 1847, the total number of baths taken was 14,965, of whom 11,767 were of the second class. The success of the Baths has been greater than was ever expected, and there is no doubt that the practice of bathing will come to be regarded generally by the working classes as essential to cleanliness and health.

The remedies to be applied to effect a diminution of the present mortality and sickness will naturally suggest themselves, when it is seen that increased mortality is invariably associated with certain known conditions. Sanatory inquiries have shown that cleanliness is conducive to health, in a more extended sense than that in which it is generally understood: that it means cleanliness of our streets and courts, as well as of our persons and homes. The remedies consist chiefly in two things—the complete cleansing of the town, and the diminution of the density of the population in certain districts. The first includes the establishment of a complete system of drainage, the removal of slaughter-houses and pig-styes, and the entire abolition of the present system of necessaries, wth their accompanying privies; the consumption of smoke, and the removal of all trades productive of noxious vapours from the Borough. Though the accomplishment of these changes would be at a considerable expense, there is reason to believe that the outlay would not only increase the comfort and health of the inhabitants, but open out a new and lucrative source of income.

The application of the manure of towns to the purposes of agriculture has of late begun to occupy the attention of agriculturists. The researches of Dr. Liebig and other chemists, both on the continent and in this country, have fully shewn that, while we were sending our ships to the ends of the earth to search for, and bring home guano, we were allowing manure of the richest quality, and worth several millions of pounds sterling, to pass annually down our rivers to the sea. The discoveries of Liebig and other organic chemists, like most other discoveries respecting the constitution and laws of the material universe, are exceedingly beautiful when regarded simply as the results of scientific research. But the doctrines to which those discoveries have led, promise in their practical application to the various purposes of agriculture, to be of immense utility in augmenting the fertility of the soil, and in superseding the rules of empiricism, by which the farmer is now chiefly guided; offering to him, in their stead, the deductions of a sound and well-established theory.

It would be presumption in me to attempt to do more than give the evidence of others upon this subject: I may, however, make one or two remarks to simplify the subject to the minds of those who have not paid attention to it. It is a fact, generally known and understood, that in the multiplied and various changes which take place around us, there is no destruction of any portion of the matter of which the various substances are composed;—that what we may call destruction is only the resolution of a compound substance into less complex combinations, or into the original elements of which the substance was composed;—that the apparent creation of a substance is only the combination of elementary particles, already existing, into other forms endowed with new properties;—that in all the multiplied changes produced by the incessant activity of the vital and chemical affinities, in the organic and inorganic kingdoms, there is neither creation nor destruction, but change simply,—the continued production and reproduction of certain forms and combinations. The elements of which the tissues of plants are composed must, therefore, be found upon the spot where they grow, obtained either from the atmosphere, or from the soil. These elements, obtained by the decomposition of carbonic acid, water, and ammonia, and certain inorganic constituents obtained from the soil, combining under the influence of the vital and chemical forces, form the vegetable tissues, and constitute the process of growth. The vegetable substances, containing the proximate principles of which the animal fabric is composed, become the food of man and beast. Food is constantly received, by the matured animal, whether man or beast, without visible increase in size. There is a constant waste of the substance of the body consequent upon thought and action. The force, which held the particles together in those complex combinations which characterise organic substances, is converted into muscular and nervous energy; the particles themselves are not destroyed, but eliminated from the body, in the form of carbonic acid, water, ammonia, and other substances, containing nitrogen and inorganic salts. These constitute the food of plants, which re-combine them into the substances used as food for animals; and thus the circle is complete, and what is called the balance of the organic kingdoms is maintained.

It is easy, therefore, to understand, without any great knowledge of chemistry, that if the produce of an acre was consumed by inhabitants living upon that acre, and nothing of the produce was sold off, the exhaustion of the soil would be an impossibility; and if the inhabitants lived upon a neighbouring acre, and all their refuse was carefully collected and replaced upon the acre whence they derived their nutriment, it would still be the same. This is, therefore, the state of the case:—we have been constantly receiving from the country supplies of food, but the refuse of the town, that is the food of plants, we have not cared to return to the fields; we prefer, apparently, that it should remain to putrify in our courts and alleys, to generate fever, to blacken and poison our water courses and rivers, or to saturate the soil on which we live with pestilence, all the while unmindful of its value, and the cost of our reckless indifference. Manures are chiefly valuable for certain salts, the phosphates that they contain, and for their nitrogen; in both these substances the excreta of the human subject are peculiarly rich. With respect to nitrogen, Liebig states that, according to the analysis of Macaine and Marcet, 100 parts of the urine of a healthy man are equal to 1300 parts of the fresh dung of a horse: hence, he adds, "it would be of much importance to agriculture if none of the human urine were lost;" and yet it is lost in this and in all our large towns. The urine of one individual amounts to about two lbs. daily, or 730 lbs. per annum; this, from 50,000 inhabitants, would amount to more than 16,000 tons. In its amount of nitrogen it would be equal to 208,000 tons of fresh horse-dung: this is the urine alone, exclusive of the solid excrements.

"If we admit," says Liebig, "that the liquid and solid excrements of man amount on an average to 1½ lbs. daily, and that both taken together contain 3 per cent. of nitrogen, then in one year they will amount to 547 lbs., which contain 16.41 lbs. of nitrogen; a quantity sufficient to yield the nitrogen of 800 lbs. of wheat, rye, oats, or of 900 lbs. of barley. This is much more than is necessary to add to an acre of land, in order to obtain, with the assistance of the nitrogen obtained from the atmosphere, the richest possible crop every year."*

Another extract from the same distinguished chemist will suffice:—

"When it is considered that with every pound of ammonia which evaporates, a loss of 60 lbs. of corn is sustained, and that with every pound of urine a pound of wheat can be produced, the indifference with which these liquid excrements are regarded is quite incomprehensible."

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* This is evidently an under-statement. The urine of an healthy adult was estimated by Haller at 49 ounces, and by Dr. Prout at 30 ounces in summer, and 40 in winter.—(See Penny Cyclopædia, article Urine.) I have taken the whole excreta at 900 lbs. per annum, which is probably below the truth.

If such be the relation of these substances to the purposes of agriculture, their money value must be very high. It has been variously estimated from 10s. to £4 per individual per annum. An intelligent farmer stated to me that in this neighbourhood the cost of manuring was about 50s. per acre per annum. We have seen that, according to the testimony of Dr. Liebig, one ton of human urine is equal to 13 tons of horse dung. The whole excreta of one individual amounts to 900 lbs. per annum, or is about equal to 5 tons of horse manure, which at 5s. per ton equals £1 5s. We have seen, from the testimony of Dr. Liebig, that the liquid and solid excreta of man are sufficient for one acre, so that when laid upon the land they should be worth 50s. in this neighbourhood. If we allow 10s. for the labour of irrigating the fields, the value ought to be 40s. when laid down at the farmstead. £1 for each individual would be an estimate below the truth, but this would give upon the population of the Borough more than £50,000 per annum. Whether the application of town manure would come into extensive use or not, would depend upon the amount of increase which it produced in the crops. Upon this point much evidence has been obtained by E. Chadwick, Esq. and others, which shews that where it has been applied in this country the value of land has been very much increased, in some instances doubled. In China and in Belgium this mode of manuring is extensively followed, with the best results. Mr. Chadwick states, that in Belgium the liquid and solid manure of an adult are sold for £1 17s. per load; and Professor Johnstone estimates them, as compared to guano, at £2 14s. per head per annum. (See Ellerman's Letter to Lord Morpeth.) The precise value will have to be determined, I apprehend, like every other article of merchandise, by the supply and demand; but whatever value it may have in the country, it has none in the town, but is a source of poison to the inhabitants, and must be removed. It is right, however, in determining the mode of its collection, to have prospective reference to its distribution. The present necessaries must be abolished, and water closets established in every dwelling. Independent of the nuisance which they necessarily occasion, there are moral considerations, which ought to have sufficient influence, in a community making any pretence to civilization and Christianity, to induce them to abandon the practice of aggregating necessaries in clusters, or of leaving one only for the joint occupancy and use of twelve, or, it may be, twenty families.

A very great proportion of the cottage property of the borough would not admit of a separate necessary for every house; so that the erecting of water-closets, with a system of pipes by which the whole may be collected, is the only plan left. The urinaria, which ought also to be erected, should be connected with the same pipes. The house drainage also, which is itself of value, might be connected with the same system, and all flow to one common depôt. This plan has been recommended by most who have written upon the subject. The plan is of course proposed with a view to its distribution, in a liquid form, by a system of mains spreading out into the country, and the liquid forced through by steam power. One or two objections have been brought against this plan, on account of the extreme dilution of the manure, and the great amount of water which would have to be conveyed upon the land, in consequence of receiving the drainage of the houses. It will be seen, however, on subjecting the matter to calculation, that little apprehension need be felt on this matter.

The quantity of manure is supposed sufficient for 50,000 acres, or a circle of 5 miles radius. The water used in the town is estimated at 1,200,000 gallons daily. Now, no water is manufactured in the town.

The drainage cannot exceed the supply. It will be less, on account of evaporation, &c., say one-sixth; or that the drainage is 365,000,000 gallons per annum. Now this, upon 50,000 acres, only amounts to $\frac{1}{3}$ part of an inch in depth, or $\frac{1}{147}$ part of the rain which annually falls upon the same surface. But as the manure could not be applied during certain seasons of the year, there is a necessity for storeing it for use until the return of spring begins to stimulate vegetation, and render the application of the manure desirable. Now, the quantity that would accumulate during four months would be 121,000,000 gallons, and would require a tank 1,000 yards long, and 366 broad, and 2 deep. The construction of such a tank in the neighbourhood of the town is out of the question; but the difficulty may be obviated by supposing each farmer to construct a tank for himself, so that the fluid might be constantly transmitted through the pipes without any accumulation in the immediate neighbourhood of the town. By this method the distribution would become manageable, and the farmer would gain another advantage, in being able to dissolve the solid manure made upon the farm, and to apply the whole by the method of irrigation; for the liquid in the tank, after receiving all the manure of his stables and cow-houses (excepting of course the straw) would remain sufficiently fluid to pass readily through the hydraulic apparatus by which he would irrigate his fields. If we suppose that the whole manure of the town was laid upon 50,000 acres, a tank 30 yards by 60, and 2 yards deep, would suffice for a farm of 250 statute acres, and would contain 595,608 gallons. This would contain its proportion of the drainage stored up for four months. All other farms being supposed to have tanks proportionate in size to the number of acres, a farm of 80 statute acres, would require one about 20 yards by 30, and two yards deep. The construction of the largest of these tanks, for embankment and puddling, would not cost more than £40, supposing the material to be obtained upon the land.

With respect to the cost and mode of working the hydraulic apparatus, for distributing the manure, I cannot do better than give an extract from the speech of the Rev. A. Huxtable, at Sir Robert Peel's, Drayton Manor, September 23rd, 1847 :—

" First, the liquid manure flows into large tanks ; *below* them is another, in which the manure is diluted with water as the weather may require, the rule being, that the hotter the weather, the weaker the manure. I have laid down over the highest part of my farm a main of green elm pipe, of two inches diameter bored in the solid wood ; at every hundred yards distance is an upright post, bored in the same manner, with a nozzle. A forcing pump fixed at the mixing tank discharges along these pipes, buried two feet in the ground, the fluid with a pressure of forty feet. Of course it rushes up these pierced columns, and will discharge itself with great velocity through the nozzle. To this I attach, first of all, forty yards of hose, and therewith water all the grass which it can reach. To the end of this hose another forty yards of hose are attached, and a still larger portion of the surface is irrigated ; and so on for as many yards as are required. When enough has been irrigated at the first upright, the nozzle is plugged, and the fluid is discharged at the next column, and so on. The cost of the prepared canvas hose, which was obtained from Mr. Holland, of Manchester, was 1s. a yard ; the wooden pipes cost me only 1s., and being underground, they will be most enduring. By an outlay of £30 I can thus irrigate forty acres of land ; and see how inexpensive, compared with the use of the water-cart and horse, the application. A lad of fifteen works the forcing-pump, the attaching the hose and its management require a man and a boy. With these, then, equivalent to two men, I can easily water two acres a day, at the rate of forty hogsheads per acre of the best manure in the world—I say *best*, because all chemists will assure you that the liquid contains the principal nitrogenous and soluble salts, and therefore is far more valuable than the dung, and it is plain enough to every man, though he be no chemist, that plants can only take up the manure in a liquid form. The principal use which I make of the hose is to water the clover, and, above all, the Italian rye-grass. From my own observation, I know that if, after each cutting, the hose immediately follows, you may cut it without wrong to the land as often as you like, and an amount of fodder will be obtained which no other plant can approach. It comes the earliest and grows the longest of all the grasses ; and I feel confident that with such appliances as I have mentioned, you may secure fifty tons per annum of this milk-giving, fat-producing, muscle-making grass. I can refer to Mr. Dickinson, of Curzon-street, as an authority for growing at least this weight of green food, and, I believe, far more. That you can cut it, by the help of liquid manure, six times a year, admits of no doubt."

Now this outlay, £30 for forty acres, includes the tanks; but as the tank for the reception of town manure would have to be larger, there would be more expense in its construction. Supposing the tanks, in the case quoted, to have cost only £10, the distributing apparatus cost only 10s. per acre; so that, on a farm of 80 statute acres, the whole expense of constructing the necessary works would not exceed £70. The total number of gallons per annum per acre would be 7,300, or 152 hogsheads. This quantity would be laid on in two days, or the manuring of an acre, by this method, would cost 10s. per annum; and if the farmer gave £1 per annum per acre, for receiving the manure of one individual per acre, the total cost of manuring would be 30s. per acre: by the present mode the cost is 50s. The amount of guano to equal the value of this manure would be a ¼ of a ton per acre, at £10 per ton, according to Professor Johnstone: so that there would be a saving to the farmer of £1 per acre, and a revenue to the town of £50,000 per annum. This sum would pay for the construction of all necessary works, and leave a handsome profit besides.

The construction of water-closets is the duty of the landlords. From the testimony of H. Austin, Esq., a self-acting water-closet may be constructed and fixed complete for 50s., and would not incur an additional rent of ½d. per week per house. I should think there is not a family in the town that would not gladly pay that sum for the accommodation. There would then be the cost of the pipes in the streets, and the principal mains. No precise estimate could be made without a survey of the town, and some definite plan of distributing the mains and pipes agreed upon. Some approximation may, however, be made to the probable cost. That portion of Great Bolton, north of the Bolton and Preston Railway, might be joined to Little Bolton, and the whole of the house drainage collected into one main or culvert, laid in the bed of the river. The whole of the inhabitants in these two portions of the borough would not exceed 40,000, and the whole drainage about 700,000 gallons. Assuming it to commence at Chorley-street, and to be continued along the river to the unoccupied land near the canal, its length would be about 1,600 yards, and the fall not less than 20 feet. Assuming these data, Morin's Formula* for sewers shews, that a sewer, 29 inches in diameter, would deliver this quantity in less than five hours. This drain would not cost more than 10s. per yard, or £800 for the whole. Some estimate may be formed of the lengths and diameters of the collecting pipes and mains, from the lengths of the water works. These mains are 36,324 yards in length: this includes the whole borough. The length for Little Bolton, and the portion of Great Bolton north of the Preston Railway, would not be 30,000 yards. The largest drains, exclusive of the main culvert, would not need to exceed 18 inches in diameter. Taking 6,000 yards at 18 inches, 10,000 at 12, and 24,000 at 8 inches diameter, we have, supposing them to be Staffordshire tile tubes, the following estimate of the cost of these pipes, and laying them at an average depth of 12 feet:—

6000 yards, 18 inch diameter	£4,500
10,000 do. 12 inch do.	3,375
14,000 do. 9 inch do.	3,762

To this sum must be added the cost of the side drains, 3 inches diameter; taking the average distance at eight yards, and the number of houses 8000, this sum would be £10,200, so that the total cost would be £21,637. The cost per individual is 10s. 10d. So that for the remaining portion of the Borough south of the Preston Railway, assumed to comprise 13,165 individuals, the cost would amount to £7,131. As this portion would have to be drained separately, the whole of the pipes would cost when laid about £28,768. To form an idea how many miles of service pipes would serve to convey the manure to its destination, is somewhat more difficult: the actual length would depend upon the distance and relative position of those farms, where it was applied. Its application, in the first instance, would be a speculation, and many would wait to see the result upon other lands before incurring expense in laying it upon their own. As it gradually came into general use, the total length of pipe would bear a less proportion to the number of farms supplied, new applicants being supplied by branches from mains already laid. The length of pipe required to supply the farms upon 50,000 acres, would therfore depend upon circumstances which cannot be foreseen, and which would vary in different localities. Let us, however, suppose it would require 300 miles of pipe, a supposition extravagantly high, and let us see what the expense would be. If the whole of the pipes were 12 inches diameter, the cost, laying included, would be £180,000. A sixty-horse engine would raise the whole of one day's drainage 300 feet high in about 12 hours. This, with pumps, boiler, engine-house, and all complete, would cost £4,700.* The land, with construction of tank, would be £2000. This is, therefore, the balance:—

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* Mechanics' Magazine, Feb. 1848.

Income from £50,000 acres		£50,000
Interest of £215,418, at 5 per cent.	10,773	
Cost of management, fuel, wages, &c. say	1,000	
		11,773
Annual income to the Borough		£38,227

Besides this system of house drainage, sewers would have to be constructed for carrying away the rain and the waste water of steam engines; and as in Great Bolton there are few sewers worth any thing, almost the whole of this work would have to be done. In Little Bolton the sewers of recent construction are much better, and are amply sufficient, as far as they extend, for surface drainage ; and if the public sewers were used only to carry off the rain, the house drainage being collected for the purpose of manure, they might empty themselves immediately into the river, without polluting it, as they do now, provided that the public streets were properly swept before they were washed; and if the pavement were improved, as it might be, and with economy, and a system of cleansing the streets by water adopted, a street with a muddy surface would be almost unknown, and the town would present an appearance of cleanliness and comfort. Nor would the expenditure required to carry out these projects, render any oppressive rates necessary; advantage being taken of the river, no sewers of very large dimensions would be requisite. A large main sewer passing through Deansgate would suffice to receive all the drainage between Deansgate and the Bolton and Preston Railway. The streets between Deansgate and the river might be drained by smaller sewers, emptying immediately into the river. The principal sewer through Deansgate, 3 feet 9 by 2 feet 8, with curved bottom, and 1200 yards long, would cost £600. 5 miles of secondary sewers, egg-shaped, 2 feet 9 by 2 feet, would probably suffice for this portion of the township, and would cost £3,960. The other portion of the township south of the Preston Railway, is larger in area, and would probably cost £5000. The complete sewering of the whole Borough would not cost more than £12,000.

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* For this estimate I am indebted to the kindness of J. Hick, Esq. of the Soho Iron Works.

The system of paving, in Great Bolton especially, is not only inefficient, but expensive. The paving in Great Bolton costs 4s. per yard, and in one of the principal thoroughfares would only last about 5 years, during which time about one-half would have to be re-laid. In Derby-street, a width of about 5 yards has to be taken up every spring for 1000 yards in length From a communication with which I was favoured by the Clerk to the Board for the repair of the highways of Manchester, it appears that the cost of a superficial square yard is 7s. 3d. This pavement is composed of Welsh sets, set one inch apart; the interstices being filled up with stone chippings and asphaltum, which renders the joints perfectly water tight. With respect to the length of time such pavement will last, this gentleman states, that "the material, so far as we are able to judge, will last for ever; and will only require relaying after the substratum, or surface, shall have become deranged from other causes than the wear of the material, for this is in no case perceptible." If we only suppose it to last for twenty years, the difference in favour of Welsh sets over the system followed at present is more than 50 per cent. The difference in the case of Little Bolton is not so great. The Lester Mill stone, used to a considerable extent in that township, is very durable. In a principal thoroughfare the pavement, I am informed, will last 20 years; but even here, the substitution of Welsh sets would be of advantage. It would seem desirable that both sets should be used—the Welsh sets for the streets, where the traffic is great, and the Lester Mill stone for private streets; and if both were laid with asphaltum, and the joints made water-tight, the surface would be close, compact, and even, and would admit of being cleansed with water like the floor of a house. The paving of Great Bolton costs about £1000 a-year, and it does not appear to improve in the least. This sum appears to keep it about in the same condition, from year to year. If we suppose the length of streets in the Borough to be 30 miles, and an average width of 10 yards, 5 miles paved with Welsh sets and the rest with Lester Mill stone, the entire paving would cost £152,900. The plan of cleansing the streets by water has been demonstrated to be far more economical than by the method of scavengers. The difference in favour of cleansing by water is, that the streets are rendered much cleaner, and at much less expense.

Mr. Thorp states, in his evidence before the Health of Towns Commission, that in Hull the cost of scavenging per mile of street, 60 feet wide, was £2 12s. 6d; the cost by water is only 7s. Mr. Hawkesley states that he has seen 1500 yards of level pavement cleansed in twenty minutes. If we suppose only 3,000 yards to be cleansed per hour, it would take one man about 22 days, at 8 hours per day, to cleanse all the streets of the Borough, and would require about 528,000 gallons of water. The whole cost, estimating the water at 1d. per thousand gallons, and the labour at 2s. 6d. per day, of cleansing the Borough, would be £4 19s., or £257 8s. per annum, if cleansed once a week.

The several items of expense incurred in placing the town in a good sanatory condition, with the exception of the expense incurred in the purchase of old property, and the formation of new streets and markets, may now be collected :—

For house drainage, urinaria, aud mains	£30,000
Sewerage	12,000
Paving the entire Borough...............	152,900
Total	£194,900

If this sum were expended at once, it would require £9,413 per annum to repay it in 30 years, principle and interest. There is expended in lighting the borough at present about £1,500 per annum. The cost of keeping the streets in repair, under the new regime, would not be above £500 per annum; the cost of washing the streets once a week £257 per annum. Incidental expenses, salaries, and so forth, would perhaps augment this sum to £3,000 per annum. If the outlay were made at once, the total annual charge would be £12,413. This is exclusive of the cost of the apparatus for distributing the manure, which would of course not be incurred unless with the certainty of return. To raise the sum necessary to meet the annual charge would require a rate of 2s. in the pound. It is not desirable to levy a rate so high as this : a rate of more than one shilling in the pound would be felt as somewhat oppressive upon the poorer inhabitants.

I should presume that no one will suppose that, because I have entered into these calculations, I would seriously recommend the immediate outlay of this sum.

I know that it is far easier to put down thousands of pounds upon paper than it is to obtain the money, and then expend it to the best advantage; but still the subject of the health of towns is a subject of life or death, and when it is known that the construction of these works will diminish sickness and preserve life, humanity would dictate that they should progress with all practicable speed. The levying a rate of 2s. in the pound would perhaps be denounced as exceedingly oppressive, and yet the poor rates average double that sum. That the expenditure upon the poor would be diminished one-half by such an improvement in the health of the town, as might be accomplished, is more than probable, and thus we should change a tax of permanent duration into one of thirty years' duration. It is, perhaps, somewhat hazardous to recommend taxation; but I would ask my fellow-townsmen whether they prefer to pay the tax in the shape of funeral expenses, doctors' bills, and poor's rates? Pay we must, in some shape or other. We cannot be healthy while we are dirty; and the penalties of our neglect of sanatory conditions are sickness and death, enormous pecuniary losses, and consequent impoverishment.

I have heard complaints made of the heavy rates of Little Bolton, and Great Bolton spoken of as being more desirable to live in, on account of the freedom from improvement rates, or, as they are termed in Little Bolton, police rates; but what is the real state of the case? It is this. In 10,000 inhabitants 84 more will die annually in Great Bolton than in Little Bolton. The population of Great Bolton is 35,000; so that we bury 294 more every year than we should if our sanatory condition were only equal to Little Bolton. The expense of this in money, to say nothing of the mental suffering, is no small matter. Their funeral expenses would be £1,470, and twenty times the number of cases of sickness would furnish another item of £2,940; so that the annual expense of neglecting to bring Great Bolton into the same condition as Little

Bolton, is £4,410. This is equivalent to a rate of about 1s. 4d. in the pound.

Now the poor man should remember that, whatever may be his views of the inequalities of taxation, sickness and death are far less impartial than the tax gatherer. The levy they make is most unequal, and presses most heavily upon the poor. The poor man had better pay a rate than struggle with sickness, or be prematurely cut off by death. If any have a direct interest in the promotion of the health of towns, it is the wretched poor, who throng our uncleansed streets and yards, the squalid denizens of our damp and dirty cellars.

As the estimates I have given are only probabilities, it may be asked why are they given at all. I answer, simply to shew, that even upon estimates beyond the truth, as I feel certain those I have given are, the expense of constructing the necessary works to render the town sweet, clean, and healthy, are as nothing when compared to the diminished sickness and prolonged life which would result. In accomplishing the desirable object of improving the health of this town, many great changes will have to be made in property now existing: houses will have to be pulled down and new streets made, the real or supposed rights of owners of property will have to be set aside for the public good. Where positive loss is sustained by any party, a just compensation should be made; but in no case ought more than the present value of the property, as it now stands, to be either claimed or given. It is desirable, also, that whenever operations commence, that the chief seats of epidemic disease should receive attention first, and the claims of the suffering poor allowed to be paramount to every other consideration. Money should not be expended in the embellishment of streets, nor in the establishment of public parks, until the Augean stable that reeks in our midst be effectually cleansed, and the dwellings of the poor made clean and salubrious, as far as can be accomplished, by an agency independent of the exertions of the poor themselves. There are at least 7000 inhabitants dwelling in cellars. It is desirable that living in cellars should be abandoned altogether, and it is probable that the Health of Towns Bill, now before Parliament, will summarily eject one-half of those now living in cellars. These poor creatures cannot dwell in the street, and unless some speedy steps be taken to provide them dwellings, the worst evils may result. Those cellars which would not be immediately evacuated would become more densely crowded still; and it is a curious fact, that in 80 cellars which I examined, the number living in them very nearly equalled the number living in the houses over them. An increased aggregation of human beings in each cellar would generally be the result of the sudden evacuation of a portion of the cellars, unless provision were made for their reception elsewhere. We have wealthy individuals, who are men of humanity and public spirit—here is a field in which they may employ their wealth to signal advantage to the poor, and with no loss to themselves. Let them erect cottages for them that are worthy of being dignified with the name of dwellings,—let some effort be made to solve the problem of cottage construction, so as to combine cheapness with comfort,—let some attempt be made to remove smoky fire-places and damp walls, and to afford the inhabitants all the necessary facilities for cleanliness and decency. At present a few walls are "run up," (that is the word used) the timbers are as slight as possible, and the workmanship to match. There is a staircase, of course, and the space under it serves both as a coal-hole and buttery. A necessary, placed, it may be, under one of the houses, makes the structure complete; and this is, I suppose, modern architecture. We may endeavour to imitate the magnificent architecture of the ancients in the gorgeous structures we erect in our large cities, but it would be a nobler ambition to succeed in applying the resources of modern science to a poor man's dwelling,—to render it attractive to him when the toils of the day are done, that home may be to him a scene of comfort and quiet. I know that in this much depends upon the moral habits of the people themselves. We may give them the means of comfort, and they may still remain in discomfort. We may pour light, and air, and water into their dwellings, and they may still remain dirty; but the condition of the dwelling has a very great re-active influence upon their morals. A man, who if he wish to read, must do so in the same apartment where all the domestic vocations are carried on, must have more than ordinary energy if he persevere. Children that are driven into the street to play, because there is too little room in the house, are not likely to grow up with steady and domestic habits; nor is it wonderful that men who leave their homes, because of its discomforts, and prefer to walk the streets in the evening, should contract irregular and dissolute habits. We want a thorough reform in the construction of workmen's dwellings: they should be so constructed that the domestic duties of the household may be discharged, without subjecting the husband, when he returns from his labour, to any annoyance that may induce him to quit his home for a walk in the street. There are several places in the town that ought immediately to be closed. Wigan Lane and Oliver Lane should both be proscribed as unfit for human residences; and it is very probable that owing to the little value of the property and high value the land would acquire, if these places were opened out, that the change would be attended with a pecuniary advantage. There is a very great amount of land on both sides of Deansgate of very little value at present, and which contains a very large proportion of the filth of the town. The yards between Spring Gardens and Howel Croft, with all their abominations, might be very readily cleared away. There are three old houses of little value in Ashburner-street, adjoining the Founder's Arms; these, if removed, would leave exposed the series of yards in question, with the old dwellings stretching down towards Deansgate. If these were re moved, as also three slaughter-houses at the bottom of the street, you would open out another street similar to Howel Croft; you would thus diminish the density of the population, and remove a great number of nuisances.

The health of towns is, perhaps, that subject which more than any other now engrossing public attention, is entitled to serious consideration, and which presents the strongest claims to the labours of the benevolent christian and the philanthropic patriot. The promotion of the health of towns is literally to heal the sick and to cleanse the leper. It is to arrest the ravages of death, and to obtain a conquest from the grave. It is to impart the bloom of renewed health to the pallid cheek, vigour and elasticity to the failing limbs, and to diffuse health, cheerfulness, and joy. Such a cause cannot fail to enlist the sympathies of the good, or to command the energies of the friends of the poor. Associations are being formed in most of our large towns, whose object is to promote health and prolong life. The formation of these institutions, and the forthcoming Health of Towns Bill, are amongst the most cheering signs of the times. They shew that, amid the whirl of business, attention can be given to the suffering poor; and that, amid the convulsions of states and the excitement of political strife, legislative energy can be spared to improve our alleys and courts, and to provide for the domestic and physical comforts of the masses.

That you, Sir, are not indifferent to the subject, the existence of this Report evidences. I have only to express a hope, that you and others of our influential townsmen may unite to further this great work in this Borough, and that these pages may not be altogether without effect in the promotion of the same object.

I remain, Sir,
Your Worship's humble servant,
JOHN ENTWISLE.